

## Image, Imagination, and Cognition

# Intersections

INTERDISCIPLINARY STUDIES IN EARLY MODERN CULTURE

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# Image, Imagination, and Cognition

*Medieval and Early Modern Theory and Practice*

*Edited by*

Christoph Lüthy

Claudia Swan

Paul Bakker

Claus Zittel



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Michel Lefftz and Caroline Heering) *Questions d'ornement (XV<sup>e</sup>–XVIII<sup>e</sup> siècles)* (Turnhout: 2014); and (with Brigitte d'Hainaut-Zveny) *Machinae spirituales. Les retables baroques dans les Pays-Bas méridionaux et en Europe* (Brussels: 2014).

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# Introduction

*Paul Bakker, Christoph Lüthy, and Claudia Swan*

The essays collected in the present volume investigate various aspects of the complex relations between *Image, Imagination, and Cognition* during the period between 1500 and 1700. What motivates the focus on these three concepts and the chronological delimitation to the early modern period? It is our conviction that, in Europe between 1500 and 1700, a thoroughgoing transformation affected the complex nexus comprised of the following: (i) what it means to understand or know phenomena in the natural world (cognition); (ii) how such phenomena came to be visualized or pictured (images, including novel types of diagrams, structural models, maps, etc.); and (iii) the role of the faculty of the imagination (which surpasses the mere processing of sense data, and takes creative flight beyond them). New conceptions were advanced, as were new ways of comprehending and expressing the relations among images, imagination, and cognition in the early modern period.

Why locate these transformations in the early modern period? According to late medieval and early modern conceptions of the workings of the mind and the senses, all that was perceived by the external senses was transferred, as it were, to the internal senses, in particular to the medium of the imagination. The mental images it produced were then subjected to the further operations of the sensitive soul, such as cogitation and memory. Combinatory imagination, whereby the imagination was deemed capable of producing wholly new images from those provided by experience, was also a key faculty or capacity of the soul. These processes and principles held sway across a variety of disciplines and practices in the early modern period and naturally encompass the triple themes of this volume.

Around 1450, the invention of moveable type enabled entirely new modes of teaching and learning through standardized images—the ‘exactly repeatable pictorial statements’ the print scholar William M. Ivins credited with fostering the rise of modern sciences.<sup>1</sup> In addition to widespread engagement with classical philosophy and theology through printed books, this era witnessed the production and dissemination of the first art historical treatises. In all manner of written texts, the role of the critical terms *imaginatio* and *phantasia* was avidly discussed and debated. But the early modern era was also an age

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1 Ivins, Jr. W., *Prints and Visual Communication* (Cambridge, MA and London: 1953) 3.

of great conflict regarding the status of religious imagery (as in the Protestant and Catholic or counter-Reformations) and of visual tools in education (such as were devised by the French humanist Petrus Ramus). At the other end of the time period under investigation, the invention of microscopes and telescopes in the seventeenth century led to the recognition that material reality far exceeds what presents itself immediately to our senses. The upshot of this recognition was a re-evaluation of the imagination, which was construed as being able to transcend simple sense data; and new forms of representation were adapted to visualize the invisible. This program of graphically visualizing the invisible culminated in the Cartesian-style ‘mechanical models’ of the second half of the seventeenth century.

This volume proposes to examine the relation between scientific (or ‘epistemic’) images, the psychological faculty of imagination, and theories of cognition at a particular moment in their much longer respective and joint histories. The era under investigation gave rise, as other scholars have demonstrated, to conceptions of images, imagination, and cognition—and of their inter-relationships—that may seem, and in some cases are, entirely distinct from modern modes of thought and practices. The role of imagination vis-à-vis science or cognition has, for example, been all but outlawed since the late eighteenth century when, as historian of science Lorraine Daston has shown, a new evaluation of genius in the work of Immanuel Kant and others shifted conceptions of the role and privilege of the imagination. Whereas originality and creativity became the standards by which artists were judged, scientists were held to norms of objectivity and factual realism; and the difference hinged on the role of the imagination.<sup>2</sup> Other patterns traced out here concerning early modern conceptions may ring familiar. In his defense of painting as a liberal art, worthy of elevation to the status of a theory, Cennino Cennini (ca. 1370–1440), for example, wrote that painting requires ‘imagination [*fantasia*] and manual dexterity’. He attributed to artists the ability, one that would soon be considered quasi-divine, to create the unknown, to discover ‘invisible things hiding in the shadow of ones in nature and to capture them with [their] hand, so that [they] can make manifest that which is not there.’<sup>3</sup> The fearsome power of the imagination to recombine sensory data, celebrated by Cennini, was both revered and abhorred, and a critical language and modes of representation developed that remain in many regards pertinent. Art historian Martin Kemp has observed that ‘the modes of representation in twentieth-century science are very much the heirs of the Renaissance revolution’, which led to ‘the rise of

2 Daston L., “Fear and Loathing of the Imagination in Science”, *Daedalus* (1998) 73–95.

3 Cennini, Cennino. *Cennino Cennini's Il Libro dell'arte*, trans. L. Broecke (London: 2015) 20.

illustration as a major tool of science'.<sup>4</sup> To this observation, we would add that the ascendance of these new visual 'tools' could not have taken place without the emergence of new theories about cognition and the role of imagination in it. It is exactly this nexus that the present volume investigates.

It seems obvious that this evolving relationship between cognition, imagination, and image led to an increased focus on the visual, in all of its forms. Whereas it is a commonplace that sight was, from Antiquity, the most privileged of the senses in Western culture, the role of the eye and of seeing became even more central and more complex in the period under consideration. The rise of empiricism in the sciences; philosophical deliberations on the workings and powers of vision; refinement of devotional models and theories of vision and perception of the divine; new technologies that offered the means to sharpen and expand the sense of sight: these elements all affected the status of ocularity in the period under consideration. As often as it was celebrated as the most acute of the senses, however, sight was also disparaged, questioned, doubted. In fact, an entirely new physics attempted to reduce all knowledge of the outside world to the sense of touch (while, paradoxically enough, explaining touch in visual terms!). The contested status of sight and vision is reflected in the history of physical images—of art. Fiery questions arose, for example, in the sixteenth century, in the context of the Protestant Reformation, about the status of images, religious images in particular. The key role that the imagination played in early modern considerations on sight and image production is fundamental to understanding artistic matters of the period, and likewise inextricably linked to religious, philosophical, and scientific modes of thinking and practices. The highly specific discourses and historiographies pertaining to the three 'primary' disciplines represented by the editors—the histories of science, art, and philosophy—tend in general to enhance the distinctions between studies of images, imagination, and cognition in the early modern period.

The first essay in this volume, by *Sander de Boer*, sheds light on the ambivalent status of the imagination within the framework of Aristotelian psychology. On the one hand, most Aristotelian philosophers agreed that all human cognition relies on the images (or 'phantasms') provided by the imagination, an embodied faculty of the sensitive soul. On the other hand, they generally believed the human soul to be immortal. This implies that, after death, the soul should be able to engage in some form of cognitive activity in the absence

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4 Kemp M., "Seeing and Picturing: Visual Representation in Twentieth-Century Science", in: Krige J. – Pestre D. (eds), *Science in the Twentieth Century* (London, New York, NY: Routledge, 2014) 361–390, at 363.

of the body, and therefore that the imagination should be able to continue to generate images. Hence, Aristotelian philosophers deemed the imagination both essential to human cognition and a potential threat to the immortality of the human soul. De Boer focuses on the highly controversial Italian philosopher Pietro Pomponazzi (1462–1525), who made the necessary dependence of human cognition on the embodied faculty of imagination the cornerstone of his attack on the possibility of immortality. According to Pomponazzi, relying on Aristotle, the human mind necessarily depends on the images provided by the imagination. Therefore, human thought without imagination is simply impossible. In his essay, De Boer examines two philosophers who responded to Pomponazzi's position: Agostino Nifo (c. 1470–1538) and Francisco Suárez (1548–1617). He argues that their rebuttals of Pomponazzi made it clear that the imagination cannot function as the link between embodied sensation and disembodied intellection—and that, in the long run, dualism and materialism would emerge as the only remaining plausible alternatives to the Aristotelian hylomorphic view of the relation between soul and body.

In the secondary literature (especially in the field of philosophy), the concept of imagination is generally discussed in relation to psychological theories of (internal) sensation and cognition. *Barbara Obrist* demonstrates that imagination played an important role in another context as well—namely, in astronomy. Her essay offers an overview of twelfth-century cosmographical and astronomical documents that refer to the imagination and to imaginary geometrical models of the spherical universe. Several of these texts also contain actual figures of previously described imaginary representations of the universe, thus enhancing our understanding of the transition from imaginary to actual, material figures. Obrist makes clear, on the one hand, that it is difficult to determine whether textual descriptions of the structure of the universe rely on actually observed three-dimensional figures (in particular, the so-called 'armillary sphere') or whether they are merely based on imaginary (memorized) representations. On the other hand, she demonstrates that, in all documents examined, the epistemic function of the actual three-dimensional figure is that of an illustration.

A number of the essays in this volume address figuration—up to and including of the workings of the imagination itself. Giving pictorial form to the imagination requires, first and foremost, commitment to a specific conception of the workings of the faculty. A number of sixteenth-century authors and practitioners advanced conceptions of the imagination in pictorial form and, by so doing, weighed in on the role of the imagination vis-à-vis the visual arts. Sixteenth-century Italian artistic practice and theory was, as several chapters in this volume emphasize, rife with considerations on the role and limits of



the imagination. *David Zagoury* traces the art theoretical term '*ingegno*' in the Florentine art world, the birthplace of Renaissance and early modern art, and in particular in the writings of Benedetto Varchi (1503–1565), a philosopher deeply engaged in Florentine cultural debates. A cognate of genius, *ingegno* was understood as a cognitive ability, and thereby related to imagination. As Zagoury shows in the course of a micro-historical analysis of events that took place over several weeks in 1547 and in which Varchi plays the central role, *ingegno*, a natural or inborn ability, was contrasted with '*fatica*' or physical labour, and the role of each in artistic production carefully weighed and judged. That these theoretical considerations were germane to artistic practice Zagoury demonstrates by way of an ingenious interpretation of a painting by the biographer and artist Giorgio Vasari of *The Forge of Vulcan*. This allegorical work, devised by Vincenzo Borghini (1515–1580), translates the tale of Thetis, Achilles's mother, commissioning a shield from Vulcan into an encounter between Minerva and Vulcan that embodies the dynamic relationship between *ingegno* and *fatica*. Zagoury thus ably shows that *ingegno* was a key concept in art, poetry, and academic discussions of the time and links it to conceptions of the imagination and to the valuation of the figure who towered over all of these domains, Michelangelo Buonarroti.

*Leen Spruit's* essay discusses one of the most prominent sixteenth-century *novatores*, Bernardino Telesio (1509–1588). In his *De rerum natura iuxta propria principia* Telesio broke with Aristotle and developed his own account of nature. While Sander de Boer focuses on authors working within the (dominant) Aristotelian psychological framework, Spruit demonstrates that in Telesio's new theory the imagination is deprived of its pivotal place. Contrary to most Aristotelians, Telesio no longer saw the imagination as a faculty that mediates between the (external) senses and the intellect, and attributed all psychological activity to 'spirit' (*spiritus*), a hot, subtle, corporeal substance common to man and animal. Telesio considered sense perception the most important cognitive function, superior to both imagination and intellectual knowledge. For him the imagination is just a capability of the 'spirit' that constitutes the human soul. Like all operations of the spirit, the workings of the imagination are grounded in the physiological structure of the organism (human or animal) and do not imply internal representations or mental images. Perception, imagination, and cognition are the result of the spirit's active response to alterations caused in the physiological structure of the organism by external stimuli.

The concept of 'spirit' also plays an important role in the essay by *Sergius Koderá*. Koderá examines one of the most prominent representatives of natural magic in the late sixteenth and early seventeenth century: Giovan Battista

Della Porta (1535–1615). In addition to writing about natural magic, Della Porta also developed a practice of natural magic, the main goal of which was to stimulate and transform the imagination of his audiences. His approach was thus not primarily theoretical (in fact, his works lack a systematic or explicit theory of the imagination) but was geared towards manipulation: Della Porta aimed at exploiting the occult and marvelous powers of the human imagination. He did so against the background of Marsilio Ficino's psychological theories, according to which *imaginatio* is the soul's primary means of communication with the body. Both Ficino and Della Porta held that images produced by the imagination are made of 'spirit', but Della Porta places greater emphasis on the material aspects of 'spirit'. In his view, 'spirit' is a powerful material 'essence' that a trained practitioner of natural magic can extract by means of distillation from almost any substance. For Ficino *imaginatio* is a faculty capable of transmitting the *figura* of an object; its main function is to represent objects. Della Porta, on the other hand, stresses the idea that the *imaginamentum* cannot be abstracted from the matter of the object it represents. He describes the *imaginamentum* as a subtle body that embodies the material qualities of things. In a way, it is for Della Porta a subtle but material essence of the thing itself rather than a formal recreation of a sense impression. The body plays a causal role in the formation of *imaginamenta* just as, conversely, *imaginamenta* have the power of transforming not only the soul but also the body.

The Netherlandish author and artist Karel van Mander translated Italian art theory into a northern idiom in his 1604 *Schilder-Boeck*, the first comprehensive history and theory of northern art and a volume of enormous cultural historical significance. In her essay, *Christine Göttler* examines Van Mander's preoccupation, as expressed in his writing and in an extraordinary drawing coeval with the *Schilder-Boeck*, with Morpheus, the god of dreams. Morpheus, the best-known child of Somnus, god of sleep, had already been described by Ovid as a 'craftsman and simulator of (human) form', able to produce in the body, by virtue of the imagination, dream images. The unusual imagery Van Mander evokes in his drawing links his artistic practice with contemporary reflections on artistic imagination and embodies his own written considerations on what was involved in artistic invention '*uyt zijn selven*' or '*uyt den gheest*'. Dream imagery was understood as the product of the imagination and Göttler shows, subtly, that Van Mander's notion of painterly spirit ('*schilder-gheest*') was rooted in a conception of the creative process being located at the boundary between visible, imagined, and dreamt worlds. Göttler considers these realms—the domains of Domogorgon, Chaos, Somnus, and related gods—in light of wider interest in theories of artistic fabrication, while demonstrating that the 1601 drawing by Van Mander ably embodies a profound conception of the workings of the artistic imagination.

In their essay, *Ralph Dekoninck, Agnès Guiderdoni, and Aline Smeesters* present and analyse a fascinating volume attributed to the *pictor doctus* Otto Vaenius (Otto van Veen, 1556–1629), *Physicae et theologicae conclusiones* of 1621. Best-known as teacher of the young Rubens, the Dutch-born Vaenius was a widely respected humanist and published emblemist in addition to being affiliated with the Habsburg court at Brussels. The *Conclusiones* is nominally a treatise on free will and predestination but, as Dekoninck, Guiderdoni, and Smeesters show, it is underpinned by an original conception of the human imagination. That such a treatise would contain an explication of the power and products of the imagination is perhaps as surprising as the fact that the illustrations, all presumably designed by Vaenius, are mathematical figures, or diagrams. Imagination, Vaenius argues, is a real being, ‘consisting of a body, a spirit, and a soul’, and man, through his imagination, creates real beings. This essay situates the remarkable agency Vaenius attributes to the imagination in the context of contemporary practices and theories and demonstrates the risks that Vaenius and the chemist Jan Baptist van Helmont (1580–1644) ran vis-à-vis church authority; that Vaenius extended and expanded on the theory propounded by the professor of medicine Thomas Fienus (1567–1631); and that Vaenius’s notions bear comparison with late sixteenth-century art theory and conceptions of *disegno*. In this regard, Dekoninck, Guiderdoni, and Smeesters’s essay relates to both Zagoury’s and Göttler’s observations on the centrality of the imagination to art theory and practice. Indeed, the essay on Vaenius concludes with an insightful analysis of an emblem (and the preparatory drawing for it) published in Vaenius’s 1607 *Emblemata Horatiana*, whereby Dekoninck, Guiderdoni, and Smeesters demonstrate that the emblem takes up Horace’s suggestions regarding the power of the imagination and reframes them in light of Vaenius’s adherence to alchemical theory and an investment in the freedom of the artist alike. That Vaenius configured an allegorical image in accordance with his working conception of the imagination makes sense, as the authors demonstrate, given the context in which he worked. The geometrical diagrams by which he elucidated his conception in the *Conclusiones* point unequivocally in the direction of later developments, however.

What kind of imagination is involved in doing mathematics, notably in solving a geometrical task? That the answers to this question varied widely over time is well known, but in his essay, *Guy Claessens* demonstrates the surprising heterogeneity even among such a narrow group as early-modern Italian defenders of the certainty of mathematics. At one extreme, the Jesuit Giuseppe Biancani (1566–1624) mistook Aristotle’s question, ‘How is it that a child can be a mathematician, but cannot be a wise man or a natural philosopher’ for an attack on mathematics, based on the assumption that mathematicians, like children, rely heavily on the imagination. In his odd answer to the alleged

reproach, Biancani connects *imaginatio* not to Aristotle's φαντασία (*phantasia*), but to a particular interpretation of Plato's εἰκασία (*eikasias*), which he moreover rejects. Biancani concludes that imagination is utterly unrelated to mathematics, the latter being essentially discursive. Albeit relying mostly on the same authorities, the Pisan professor Jacopo Mazzoni (1548–1598) reached a very different conclusion. A comparison between Aristotelian and Platonic philosophy had convinced Mazzoni that 'imagination is not a different disposition from discursive thought, since both arrive at their conclusions by means of a mathematical object'. According to Mazzoni, a proper demonstration proceeds discursively, but by means of mathematical objects (*per mathematica*).

The topic of the subsequent essay, by *Christoph Lüthy*, is tangentially related to that of Claessens. It analyses the role that mathematical ratios, real or pseudo-diagrammatic images, and the presumed connection between musical intervals and astronomical magnitudes played in the controversy between Johannes Kepler (1571–1630) and Robert Fludd (1574–1637). Kepler, the imperial astronomer, and Fludd, the Rosicrucian doctor, shared the conviction that the organization of the cosmos was related to musical ratios, but they disagreed violently over the application of these ratios to physical space, and over the status of their respective visual 'demonstrations'. Images and imagination became central topics in the controversy, which revolved around the antagonists' diametrically opposed notions regarding the limitations of God's mathematical mind; the evidence furnished by the human imagination; and the relation between astronomical data-collecting and aprioristic understanding. In the course of the debate, Kepler tried to establish his intellectual superiority through his 'diagrams', which he pitted against Fludd's (mere) 'paintings'. Not only did Kepler's diagrams fail to persuade Fludd but, as it turns out, Kepler stretched the original meaning of the diagram beyond Euclidean rigor, smuggling in presuppositions that do not pertain to mathematical diagrams.

*Dennis Sepper* offers an analysis of the role attributed to imagination by two founding figures of Western philosophy, Aristotle for ancient and medieval thought, and Descartes for modern philosophy. The Aristotelian model is progressive: motion in sensation continues in the body and produces similar appearances anew in the *phantasia*, enabling purposive behaviour. While animals also possess imagination, only humans use its ingredients, the *phantasmata*, for higher abstraction and for thinking and reasoning. Sepper closely examines how these *phantasmata* work within the Aristotelian economy of the human psyche. It is interesting in the light of the essays by Claessens and Lüthy to note that because of the role of imagination in mathematics, Descartes was convinced from early on that imagining could be practiced, improved, and made methodical; this conviction lies behind

his early *Regulae ad directionem ingenii*. From the 1630s onwards, the mental manipulation of geometrical forms became ever more a model for thinking about the physical world, namely in terms of moving particles possessing merely geometrical extension (*res extensa*). At the end of his life, Descartes attributed to imagination yet another role: first and foremost an act of the will, it could therefore be connected to the practical, ethical, and political dimensions of human life.

This volume concludes with a contribution by Sybille Krämer, which examines the way in which schematization, imagination, and intuition are related in Immanuel Kant's mature writings. Commentators have often been taken aback by Kant's assertion that philosophy proceeds discursively and on the basis of deductive reasoning, but that mathematics proceeds intuitively and on the basis of 'pure intuition'. How could intuition—so the objection goes—produce necessarily deductive mathematical truths? Krämer tries to respond to that objection through a 'diagrammatological interpretation' of Kant's claim. There exists, she maintains, for Kant a type of non-empirical form of intuition that is an abstraction from a specifically mathematical form of figuration. The key text is the chapter of the *Critique of Pure Reason* on the 'Schematism of the Pure Concepts of Understanding', which explains how 'conception' (which is about the general) and 'intuition' (which is about the particular) can be conjoined by the mediation of the 'transcendental schema', which is a 'product of the imagination'. The synthetic function of imagination (or *Einbildungskraft*) which is active in the schematism makes it possible to match up (i) empirical concepts, (ii) mathematical concepts, and (iii) concepts of pure reason with images, in a dynamic process that applies an operational rule to the concept at hand. When geometers imagine a triangle, they mentally construct it: they produce 'a priori the intuition corresponding to it'. With his combination of empirical, but rule-guided construction and a priori necessity, Kant is found to be an heir to a Euclidean understanding of geometry as a non-empirical science that involves rules for the graphic embodiment of forms through points, lines, and planes. Krämer's essay not only suitably rounds off a volume that examines early modern notions of image, imagination, and cognition, but it also adds a further twist to the question, also addressed in the essays by Claessens and Lüthy, regarding the connection between imagination, geometrical figuration, and proof.

This volume is the final byproduct of two projects. The first was *From Natural Philosophy to Science*, which was funded by the *European Science Foundation* (ESF) and hosted between 2003 and 2007 by the Center for the History of Philosophy and Science at Radboud University, Nijmegen (The Netherlands).

The aim of that project was to investigate the emergence of the modern natural scientific disciplines out of the shared context of natural philosophy, and the concomitant fragmentation of the notion of knowledge. All four working groups addressed, in one way or another, the question of the relation of knowledge to the structure of reality, on the one hand, and to the structure of the human mind, on the other. Working group 1 (led by Sophie Roux) addressed the emerging understanding of the world as a machine and the imaginary structures that were postulated to explain it. Group 2 (led by Henrik Lagerlund) studied the evolving ideas of mind in its relation to the body and to its cognitive faculties. Group 3 (led by Frans de Haas) investigated the evolution of the logical and methodological structures of theory formation; and Group 4 (led by Sachiko Kusakawa) examined the contexts of natural philosophy, with a focus on the role of the visual in the presentation, memorization, and transmission of knowledge.

The second project the present volume caps was *Visualizing the Invisible: Representations of Matter and Motion since the Renaissance*. This research project, funded between 2005 and 2010 by the Netherlands Organization for Scientific Research (NWO), investigated the logic and function of historical scientific (or ‘epistemic’) images, and specifically the evolution and taxonomy of chemical and physical diagrams, images, and emblems from the sixteenth through the eighteenth century. It concluded in November 2012 with a conference entitled *Image, Imagination and Cognition: Early Modern Theory and Practice*, generously hosted by the Netherlands Institute for Advanced Studies (NIAS). That conference formed the basis for the present collection of essays.

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# Imagination, Images, and (Im)Mortality

*Sander W. de Boer*

Understood as the ability to make use of images in cognition, the imagination had an ambiguous status in the later Middle Ages and Renaissance. On the one hand, it was believed that all human thought relies—at least to some extent—on the images provided by the imagination. Here, Aristotle's adage that 'the soul never thinks without a phantasm' in *De anima* 111.vii furnished the key argument. On the other hand, it was believed that the human soul is immortal and should therefore be able to continue to engage in some form of cognitive activity in the absence of images. Imagination was considered to be an embodied faculty, making it both essential to human thought and a potential threat to the immortality of the human soul. This essay explores the complex status of the imagination, with particular regard to the question of immortality. It opens with a brief overview of the role of the imagination in Thomas Aquinas's (1225–1274) account of human cognition. Accounts such as his gave rise to interpretive challenges as regards the immortality of the human soul, which were addressed by Pietro Pomponazzi (1462–1525) with particular urgency. I discuss two different ways in which philosophers dealt with these difficulties. The first was developed by Agostino Nifo (c. 1470–1538), one of the first to respond to Pomponazzi. The second was advanced by one of the greatest philosophers of the sixteenth century, the Jesuit Francisco Suárez (1548–1617). My aim is to show that both succeed only at the cost of downplaying the importance of our imagination.

## Imagination in Aristotelian Philosophy: An Outline

When discussing Aristotelian accounts of cognition, such as that of Aquinas, a complication needs to be addressed from the outset. We are used to making a distinction, at least at a pre-theoretical level, between body and mind. From this perspective, the mind is the place where all mental activity takes place, including the recollection and manipulation of images. Aristotelians, by contrast, tended to speak of a 'soul' rather than a 'mind', and there are some crucial differences between the two notions. The first is that whereas having a mind is typically human, having a soul is not. Every living thing, Aristotle argues,

has a soul; for this reason he defines the soul as the principle of life in all of its manifestations.<sup>1</sup> Saying that something has a soul is therefore equivalent to saying that it is alive. And according to the Aristotelian conception of the soul, many of the phenomena later ascribed to the immaterial disembodied mind should instead be ascribed to the embodied soul, including sensation and imagination.

Although there are as many types of life as there are biological species, Aristotle and his interpreters categorised living things in three groups. The first consists of plants, which have only a vegetative soul, meaning that their vital functions are limited to nutrition, growth, and reproduction. The second group consists of the non-rational animals. Living beings belonging to that group have a sensitive soul; not only do they possess the functions ascribed to plants, but they are also able to move from place to place. Moreover, they have senses, through which they are able to perceive the world. As already mentioned, all these functions are embodied, just like those belonging to the vegetative soul. The last group, human beings, is capable of even more—namely, the exercise of rational thought and free will. These two functions, according to nearly all Aristotelian philosophers, transcend the material body and are not exercised in any bodily organ.

To understand Aristotelian views of the role of imagination, we must therefore turn to the sensitive soul and its embodied activities. The medieval tradition distinguished between two types of senses: external and internal. The five external senses provide our initial cognitive access to the world; they allow us to see colors, hear sounds, feel softness and roughness, and so on. According to Aristotelian philosophers, these sensible qualities are real features of the world, and exist as such independently from our perception. Their technical term for these features is ‘accidental forms’. All perceptual activity, they argue, consist in our cognitive faculties taking on the same forms as exist in the thing we perceive, without taking on its matter.<sup>2</sup> In seeing the color blue, for instance, our eyes take on the same form ‘blue’ as is present in the blue thing that we see. Our perceptual faculties become, in a sense, identical to the thing perceived. Granted, the way in which the form blue exists in the eye is not the same as the

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1 Aristotle's definition of the soul in terms of life rather than in terms of mental activity is found in Aristotle, *De anima* 11.1, 412a18–19, trans. J.A. Smith, in Barnes J. (ed.), *The Complete Works of Aristotle. The Revised Oxford Translation* (Princeton – Chichester: 1984), 656: ‘Hence the soul must be a substance in the sense of the form of a natural body having life potentially within it’.

2 Cf. Aristotle, *De anima* 11.12, 424a17–24.



way in which it exists physically in the blue thing perceived.<sup>3</sup> But the key point still holds: the activity of perception consists in becoming identical in form to the object perceived. A similar account is given of intellectual cognition. This process, in which our senses take on the forms of the things perceived, is, however, only part of the story of how cognition occurs. The information provided by these senses needs to be processed and stored, sequentially, it was argued, by a system of internal senses. One of the reasons for this is that we do not perceive particular colors, or sounds, or smells as such and independently of one other; we perceive particular substances possessing all these forms combined. Rather than experiencing separate perceptions of red, of juicy, of round, and of sweet, I have the perception of a red, round, juicy, sweet apple. This can only be explained by the possibility that the information provided by our external senses is somehow conjoined, and is present in a single place where this combined perception is formed. This is one of the principal arguments in favor of the first of the internal senses, the common sense. Aquinas calls it the common root of all senses: it is responsible for combining all the sensory information into a single 'image', the so-called phantasm.<sup>4</sup>

Imagination, or fantasy, was also classified as an internal sense.<sup>5</sup> It was deemed responsible for, among other things, storing the phantasms generated by the common sense, and then making these available to our intellect. As such, imagination was the knot that tied sensation and reason together.<sup>6</sup> But the imagination was viewed as more than merely a passive storehouse

3 For more details, cf. Pasnau R., *Theories of Cognition in the Later Middle Ages* (Cambridge: 1997), ch. 1.

4 The scare quotes around 'image' are there because strictly speaking, the phantasm is not an image, but a unified percept containing the information obtained through all five senses. Nevertheless, the examples and metaphors used in the medieval discussion were virtually all visual. I will omit the scare quotes from now on. Cf. Pasnau R., *Thomas Aquinas on Human Nature* (Cambridge – New York: 2002) 190–199.

5 The exact number of internal senses and their ontological status was debated, but the list usually included at the very least common sense, memory, and imagination. For an overview of the medieval tradition of the internal senses, cf. Wolfson H.A., "The Internal Senses in Latin, Arabic, and Hebrew Philosophic Texts", *The Harvard Theological Review* 28, 2 (1935), 69–133, Harvey E.R., *The Inward Wits. Psychological Theory in the Middle Ages and the Renaissance* (London: 1975), Steneck N.H., *The Problem of the Internal Senses in the Fourteenth Century*, Ph.D. dissertation (University of Wisconsin: 1970), and Di Martino C., *Ratio particularis. Doctrines des sens internes d'Avicenne à Thomas d'Aquin. Contribution à l'étude de la tradition arabo-latine de la psychologie d'Aristote* (Paris: 2008).

6 I owe the metaphor of imagination as knot to Veenstra J.R., "The Subtle Knot: Robert Kilwardby and Gianfrancesco Pico on the Imagination", in Nauta L.W. – Pätzold D. (eds.), *Imagination in the Later Middle Ages and Early Modern Times* (Leuven – Paris: 2004) 1–20.

of forms. It also plays an active role, where it combines previously acquired phantasms and thereby produces new phantasms at will—a golden mountain being the classic example.<sup>7</sup> The dual passive and active aspects of the imagination led several authors to posit the existence of two separate faculties: a (passive) imagination and an (active) fantasy. Aquinas, however, does not, and uses ‘fantasy’ and ‘imagination’ interchangeably to denote a single internal sense that combines both passive and active roles.<sup>8</sup>

Most, though not all, animals were said to possess a faculty of imagination; indeed, it was argued that without imagination animals would not be able to function for a substantial period of time. As Aquinas points out:

One must recognise, however, that the life of a complete animal requires that it apprehend a thing not only when that which is sensible is present, but also when it is absent. Otherwise, since the movement and action of an animal follow apprehension, the animal would not be moved to seek anything absent.<sup>9</sup>

In other words, imagination is not unique to human beings; virtually all animals must have it, if only because otherwise they would die of hunger and thirst in the absence of food and water, rather than go out searching for these. It is the imagination that allows both humans and animals to recall an object when it is absent, and so to direct their activity toward procuring or avoiding that object.<sup>10</sup> Without this ability, animal life in general, and human life in particular, would quickly come to an end. The insistence of Aristotle and his medieval commentators on the presence of imagination in all animals tells us something important about the status of the phantasms on which the

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7 The imagination was invoked in the explanation of a remarkably wide range of phenomena, including dreams, visual illusions, prophecy, genius, melancholy, and birth defects. In this paper I will focus almost exclusively on its role in human cognition.

8 Thomas Aquinas, *Summa Theologiae* 1a, q. 78, a. 4. All translations from the *Summa* are taken from Pasnau R., *The Treatise on Human Nature. Summa Theologiae 1a 75–89* (Indianapolis – Cambridge: 2002).

9 Thomas Aquinas, *Summa Theologiae* 1a, q. 78, a. 4, 74.

10 For the connection between desire and imagination, cf. also Aristotle, *De anima* 11.2, 413b17–24, 658: ‘Just as in the case of plants which when divided are observed to continue to live though separated from one another [...] so we notice a similar result in other varieties of soul, i.e. in insects which have been cut in two; each of the segments possesses both sensation and local movement; and if sensation, necessarily also imagination and appetite; for, where there is sensation, there is also pleasure and pain, and, where these, necessarily also desire’.

imagination acts. Since non-human animals lack reason, these phantasms are not pseudo-concepts. Moreover, since non-human animals lack any form of intellect, phantasms are not present in the intellect. Instead they are constructed and preserved by fully embodied faculties. This is why it is apt to refer to them as images, as long as we keep in mind that the visual dimension is only part of the information contained in them, as noted above.

We may also approach imagination from the perspective of its relation to the intellectual soul found only in human beings. In this regard, there is something typically human about it. In human beings, the imagination has a strong link to the intellect—so strong in fact, that it prompted Aristotle to wonder whether human rational thought could even be separated from imagination. Every medieval author was familiar with the following tentative remark from Aristotle's *De anima*:

A further problem presented by the affections of soul is this: are they all affections of the complex of body and soul, or is there any one among them peculiar to the soul itself? [...] Thinking seems to be the most probable exception; but if this too proves to be a form of imagination or to be impossible without imagination, it too requires a body as a condition of its existence.<sup>11</sup>

According to many of Aristotle's medieval commentators, the link between human thought and imagination is precisely what distinguishes us from disembodied intellects—that is to say, from the angels; our embodied thought is inextricably bound up with images, whereas their disembodied thought is not. To put this more precisely, human thought depends on images in two ways. First, we require images in the sense expressed in the adage that 'nothing is in the intellect that was not first in the senses'.<sup>12</sup> In other words, there are no innate ideas; all our abstract concepts have their ultimate basis in sensation. But we also need images in the second, much stronger sense that we never seem to think without using them. Aquinas gives the following two arguments for this stronger thesis:

11 Aristotle, *De anima* 1.1, 403a3–5 and 8–10.

12 Although the adage expresses an Aristotelian view on the acquisition of knowledge and was regularly attributed to Aristotle in medieval texts, the phrase as such is not found in the works of Aristotle. Cf. Cranefield P.F., "On the Origin of the Phrase *Nihil est in intellectu quod non prius fuerit in sensu*", *Journal of the History of Medicine and Allied Sciences* 25, 1 (1970) 77–80.

For we see that when the power for imagination has its action impeded by damage to the organ [...] the person is impeded from actually understanding even the things he has already acquired knowledge about. Second, anyone can experience within oneself that when one tries to understand something, one forms certain phantasms for oneself by way of examples, in which one examines, as it were, the thing one is striving to understand.<sup>13</sup>

The first example concerns persons in whom the anterior part of the brain is damaged, which is where the organ of imagination was supposed to reside.<sup>14</sup> Such persons, according to Aquinas and his contemporaries, lose at least part of their capacity for rational thought. Given that the intellect itself is not an embodied power, and therefore cannot be affected directly by damage to the brain, the only remaining explanation is that there is something wrong with the images on which the intellect relies. The second example requires less comment. When we think about the properties of a triangle in mathematics we tend to picture a triangle, and when we think about humanity in general we tend to picture a human being. Similarly, when teaching, we often use visual examples. Without the phantasms provided by the imagination, therefore, human thought seems to come to a halt.<sup>15</sup>

Compelling as this view was from a psychological viewpoint, a tension arose as soon as it was considered from a theological perspective. If the connection between imagination and intellect is understood to be so strong as to make imageless thought impossible, the immortality of the human soul is called into question. The Bible states that all men will die ‘and after that comes judgment’ (Hebrews 9:27). This implies that the human soul will continue to exist and be able to understand things even after the death of the body. But how could our immortal disembodied soul continue to function, once the bodily faculty of imagination has been corrupted, if all thought relies on bodily images? If, on the other hand, one tries to safeguard immortality by making the connection between imagination and intellect loose enough to allow for imageless,

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13 Thomas Aquinas, *Summa theologiae* 1a, 84.7, 153.

14 Cf. the contribution by A.R. Verboon to the present volume.

15 The thesis that thought is image-like became highly controversial in the twentieth century. But for a contemporary defense of the vital role of images in thought, cf. Kosslyn S., *Image and Brain: the Resolution of the Imagery Debate* (Cambridge – London: 1994). For an overview of recent debates, cf. Thomas N.J.T., “Mental Imagery”, in Zalta E.N. (ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2014), URL = <<http://plato.stanford.edu/archives/spr2014/entries/mental-imagery/>>.

disembodied thought, the Aristotelian biological framework in which the soul-body relationship was understood begins to break down. If having a soul is equivalent to being alive, and if soul and body are not two distinct entities, as Aristotle maintains, one would expect the connection between intellectual thought and bodily images to remain constant. The hypothesis that the soul in its separated state is somehow able to understand things without recourse to phantasms might easily lead to the conclusion that this disembodied and separate soul has a more perfect way of knowing things than the embodied soul has. This, in turn—at least from an Aristotelian point of view—sounds dangerously close to a form of Platonism, in which the body is ultimately nothing but a hindrance to cognition.<sup>16</sup>

Aquinas's solution was to allow for imageless thought after death. Although human cognition in the soul's normal, embodied state is inextricably bound to images, this does not apply to the soul's supernatural disembodied state. In this disembodied state, cognition takes place in an entirely different manner, in which everything that is required for knowledge is directly infused in our soul through 'the influence of the divine light'.<sup>17</sup> But Aquinas was very clear on one point: This supernatural mode of disembodied, imageless cognition is in every respect *inferior* to the normal embodied mode, and it is necessarily fuzzy and incomplete.<sup>18</sup> Angelic minds are made for imageless thought. Human souls, by contrast, are not.

### Pietro Pomponazzi's Views

The tension between the Aristotelian biological conception of the soul-body relation and the requirement that the intellective soul should survive the corruption of the body received one of its most pressing formulations in Pietro Pomponazzi's *On the Immortality of the Soul* (*De immortalitate animae*, 1516), published just three years after the Fifth Lateran Council promulgated the

16 Even in Plato, however, the images obtained through sense perception play a role in the acquisition of knowledge. The process of remembering the Ideas begins with the perception of bodily things (cf. for instance *Meno* 81d4–5; *Phaedo* 72e3–76e7; *Symposium* 210a–211d). But the only reason that our knowledge needs to be reawakened is that the soul has lost the knowledge of the Ideas it once had before becoming embodied. The bodily images are therefore at most a stepping stone.

17 The soul's disembodied mode of cognition is discussed in Thomas Aquinas, *Summa theologiae* 1a, q. 89.

18 For discussion, cf. Pasnau, *Thomas Aquinas on Human Nature* 377–380.

decree *Apostolici regiminis* (1513), which condemned and rejected ‘all those who insist that the intellectual soul is mortal,’ and ordered philosophers to ‘defend church doctrine and refute the philosophical position whenever they teach the conclusions of philosophers where these are known to deviate from the true faith.’<sup>19</sup> Pomponazzi’s aim in his treatise, as he writes in the opening sections, is to answer two questions. First, what can be said about the immortality of the soul from the viewpoint of natural philosophy, excluding revelation? Second, what were Aristotle’s views on this subject? Notwithstanding the title of his treatise, Pomponazzi argues repeatedly and persuasively that, at least according to Aristotelian doctrine, our intellect completely depends on the body for all its functions, including thought. Imageless, disembodied thought is therefore impossible. It is important to note that he never explicitly draws the conclusion that the human soul perishes with the body, arguing instead that our soul is ‘truly and unqualifiedly mortal, but relatively and improperly speaking immortal,’ and that man is ‘neither unqualifiedly mortal nor unqualifiedly immortal but embraces both natures’. But no one trained in Aristotelian philosophy could have failed to comprehend the implications.<sup>20</sup>

Pomponazzi’s equivocations on the possibility of immortality undermined one of the most common arguments for securing the immortality of the soul. Developed in the Middle Ages on the basis of Aristotle’s tentative remarks on the separability of the intellect, this involved making a distinction between two ways in which our intellectual soul can be said to depend on the body. The first is that it depends on our body *as the subject in which it inheres*, which would imply that it can only exist as a part of the body. The second is that it depends on the body *as its object*—that is, it needs the phantasms that are produced by an embodied perceptual faculty (the common sense) in order to think. Thus, although our intellect depends on the body for the supply of images that are required for thinking, it does not depend on the body for its continued existence. And because the intellectual soul does not depend on the body for its continued existence, it can survive its separation from the body.

Useful as this distinction between the two ways in which our intellectual soul can be said to depend on the body may have been, it was precarious from the start. Pomponazzi argued against any use of this distinction by claiming that our intellect is inextricably bound to the phantasms provided by the

19 Tanner N. – Alberigo G., *Decrees of the Ecumenical Councils*, 2 vols (Washington: 1990) 1: 606.

20 Pomponazzi Pietro, “Tractatus de immortalitate animae” (1516), transl. W.H. Hay II, in Cassirer E. – Kristeller P.O. – Randall J.H., Jr. (eds.), *The Renaissance Philosophy of Man* (Chicago – London: 1948) 282 and 314.

imagination, 'for in all cognition, however far abstracted, we form some bodily image'.<sup>21</sup> Because of this relation, human thought without imagination is simply impossible. And clearly, if there can be no thought without imagination, it does not help to maintain that the intellect does not require the body as the subject in which it inheres. A disembodied soul would be utterly incapable of functioning in the absence of phantasms, and could therefore not continue to exist, at least not in any meaningful sense. In sum, what began as a tentative remark in Aristotle—namely, that human thought might prove impossible without imagination—was now being presented as the most compelling evidence available for the mortality of the human soul.

It need not concern us here whether Pomponazzi was convinced that the soul was indeed mortal, or whether he was sincere in saying that he only wanted to show that the mortality of the soul had been Aristotle's view, but that in philosophy the question of immortality cannot be answered by natural reason alone.<sup>22</sup> If he was sincere, it certainly did not help that he connected the mortality of the soul with the idea that true virtue should be its own reward rather than being rewarded in the afterlife.<sup>23</sup> In any case, he was read by many as having actually defended the view that the soul was mortal. Pomponazzi's treatise is well known, and I will not discuss it further. Instead I will turn to the question of how Aristotelian philosophers accounted for the relation between thought and images after the publication of this treatise, starting with one of the first philosophers to respond to Pomponazzi, Agostino Nifo.<sup>24</sup>

### Agostino Nifo's Rebuttal

The Italian philosopher Agostino Nifo wrote a lengthy rebuttal of Pomponazzi, titled *A Small Book on the Immortality of the Soul Directed against Pietro Pomponazzi* (*De immortalitate humanae animae libellus adversus Petrum Pomponatium*), which was published in 1518, only two years after Pomponazzi's

21 Pomponazzi, *Tractatus de immortalitate animae* 319. Cf. also pp. 305, 327, 342.

22 Pomponazzi was not the only philosopher to read Aristotle in this way. In his commentary on *De anima* (1509), the Thomist philosopher Cajetan (Thomas de Vio) had also argued that according to Aristotle, the soul is mortal.

23 Pomponazzi, *Tractatus de immortalitate animae* 350–363.

24 For the reception of Pomponazzi's treatise, cf. Gilson E., "Autour de Pomponazzi: Problématique de l'immortalité de l'âme en Italie au début du XVI<sup>e</sup> siècle", *Archives d'histoire doctrinale et littéraire du Moyen Age* 36 (1961) 163–279, and Pine M., *Pietro Pomponazzi. Radical Philosopher of the Renaissance* (Padua: 1986).

text.<sup>25</sup> The treatise begins with a discussion of the meaning of the key passage in Aristotle's *De anima*, cited above (that 'a part of the soul may be separate') in order to determine whether or not Aristotle had held that the human soul is immortal. To this end, Nifo also considers what Aquinas and Averroes had said on the matter. Aquinas had interpreted Aristotle's tentative suggestion as evidence that Aristotle defended the immortality of the whole individual human soul. In his reading, as we have seen, the human soul is able to survive the corruption of our body because it has one activity which it is able to perform without needing the body—intellectual thought. This is not the only possible reading of the passage, however. Averroes (1126–1198), one of the most famous commentators on the works of Aristotle, also read the passage as affirming the immortality of the soul. In contrast to Aquinas, however, he did not suggest that this amounts to personal immortality. In his view, the only way for any intellect to be immortal and eternal is for it never to be embodied in the first place. The separate part of the soul Aristotle spoke about, he argues, is therefore neither the whole human soul, nor any one of its parts. Instead, it is a separate, unique, and divine entity. While this divine intellect makes human thought possible by entering into a relation with our embodied cognitive faculties, it cannot provide personal immortality.<sup>26</sup>

Interestingly, Nifo had followed Averroes's interpretation in his younger years. But by the time he responded to Pomponazzi, he had become convinced that Averroes misunderstood Aristotle on this point.<sup>27</sup> The core of Nifo's own strategy for demonstrating the immortality of the human soul—both in his reading of Aristotle's *De anima* and in the formulation of his own position—is a distinction between the soul *qua* soul and the soul *qua* intellect, which he formulates as follows:

Therefore, when the intellective soul ceases to inform the body, it ceases to be soul; it does not, however, cease to be intellect or an intelligence,

25 Pomponazzi, in turn, replied with his *Defensorium adversus Augustinum Niphum* (1519).

26 On Averroes's reading of Aristotle's remarks on the human intellect, cf. Taylor R.C., "The Agent Intellect as 'form for us' and Averroes's Critique of al-Fârâbi", *Tópicos* 29 (2003) 29–51.

27 Cf. Mahoney E.P., "Agostino Nifo's Early Views on Immortality", *Journal of the History of Philosophy* 8, 4 (1970) 451–460, and Hasse D.N., "Aufstieg und Niedergang des Averroismus in der Renaissance. Niccolò Tignosi, Agostino Nifo, Francesco Vimercato", in Aertsen J.A. – Pickavé M. (eds.), *"Herbst des Mittelalters"? Fragen zur Bewertung des 14. und 15. Jahrhunderts*, *Miscellanea Mediaevalia*, 31 (Berlin: 2004) 447–473.



nor does it cease to be; hence, although that which is soul remains after death, it does not remain *qua* soul, but *qua* intellect or *qua* intelligence.<sup>28</sup>

The soul *qua* soul corresponds to what is expressed in the Aristotelian definition of soul as the ‘first actuality of a physical organic body having life in potency’. This soul *qua* soul is that which differentiates living bodies from non-living things. Since the relation to the body is lost after death, the soul does not survive under the aspect expressed here: *qua* soul, it cannot exist without a body to inform. But it has a second aspect, expressed by the phrase ‘*qua* intellect’, in which it does not depend on the body for its existence. Because the act of understanding is not exercised in any bodily organ, that which is soul while it informs the body can survive as intellect, even when the body is corrupted. As long as the soul informs the body, it is both soul and intellect. Once the soul ceases to be the act of the body, it also ceases to be soul although it remains as intellect. This, according to Nifo, is Aristotle’s true view. His interpretation has the additional benefit of being able to explain the apparently conflicting passages in Aristotle concerning the immortality of the soul. Rather than being equivocal or even inconsistent, Aristotle has in mind the soul *qua* soul in some places, and the soul *qua* intellect in others.

Even if we were to grant Nifo his exegesis of Aristotle’s *De anima*, it is one thing to say that Aristotle believed the soul to be immortal, and quite another to say that its immortality can be demonstrated, or at least made plausible, on natural philosophical grounds. For this, Pomponazzi’s arguments about the inextricable connection between intellect and imagination would first need to be rebutted. And it is not immediately clear how Nifo’s distinction would help there. If what remains after death is an intellect or intelligence, it must continue to be able to engage in thought. And if all thought depends on phantasms, this, as Pomponazzi had argued, is impossible.<sup>29</sup> Only if our intellect is able to function on its own, without any help from the imagination, can it be

28 ‘Propterea, cum intellectiva anima desinit corpus informare, desinet esse anima; non tamen desinit esse intellectus aut intelligentia, aut desinet esse; quare, licet id quod anima est post mortem remaneat, non quidem ut anima, sed ut intellectus vel intelligentia remanet’. Nifo, Agostino, *De immortalitate humanae animae libellus adversus Petrum Pomponatium*, ed. and transl. Valverde J.M.G. – Raimondi F.P. (Milan: 2009) 90.

29 One way in which the question of how a disembodied intellect can continue to function was often addressed, was by considering whether *post-mortem* memory of particular events would be possible. Cf. Perler D., “Gibt es eine Erinnerung nach dem Tod? Zur methodischen Funktion der *post mortem*-Argumentation in der spätmittelalterlichen Erkenntnistheorie”, in Aertsen J.A. – Pickavé M. (eds.), *Ende und Vollendung. Eschatologische Perspektiven im Mittelalter*, Miscellanea Mediaevalia, 29 (Berlin: 2002) 448–464.

truly immortal. To fully understand Nifo's position, we must therefore turn to his views on imagination.

First and foremost, Nifo, like Aquinas, emphasises that our intellective soul has a necessary connection to our imagination, and is utterly unable to think without using phantasms, which was precisely Pomponazzi's point:

I, however, not receding from those things that the blessed Thomas [Aquinas, *SdB*] said, say that the intellective soul, *as* soul, cannot understand without phantasms, for, *as* soul, it is act of the body, to which the sensitive powers have a necessary connection to such a degree that without these powers the soul cannot rise to actuality.<sup>30</sup>

Were it not for the distinction between soul *qua* soul and soul *qua* intellect, this necessary connection would exclude any possibility of immortality. With the distinction in place, however, Nifo is able to limit the necessary connection to soul *qua* soul. But he still needs, as he clearly recognises, to offer a positive account of how the soul *qua* intellect can continue to function in the absence of phantasms.<sup>31</sup>

Nifo's first strategy is to find a way to circumvent Pomponazzi's conclusions even when it is granted for the sake of argument that our disembodied intellect would be utterly incapable of functioning without phantasms. In that case, Nifo argues, it is still less bad (*minus malum*) and less contrary to the way we argue in natural philosophy (*minus contra physicas rationes*) to hold the view that our intellect is immortal. For even if we were forced to admit that the separated soul is in an idle state (*otiosum*) because it can no longer understand anything, this would still be preferable to saying that the soul dies with the body. More to the point, there is no need to agree with Pomponazzi that our soul *qua* intellect is unable to think without phantasms. What our intellect really needs in order to think are not phantasms, but so-called intelligible species. These species are universal representations, such as whiteness

30 'Ego vero, ab his quae Divus Thomas inquit non recedens, dicerem intellectivam animam, quo anima est, intelligere non posse sine phantasmatis, nam, quo anima est, actus corporis est, cui virtutes sensitivae necessariam connexionem dicunt, adeo ut sine illis anima in actum exire non potest'. Nifo, *De immortalitate animae* 96.

31 'Post haec restat refellere Pomponatii rationes quibus mortalitatem probabat, et primo illam suppositionem in qua omnis rationum vis consistit, quod videlicet sine phantasmate anima non intelligit, quare si post mortem remaneret, otiosa remaneret'. Nifo, *De immortalitate animae* 264.

or humanity, which are normally abstracted from the bodily phantasms.<sup>32</sup> Although these are a *conditio sine qua non* for thought, it does not matter, argues Nifo, how these species come about. It does not need to be through phantasms, even though that is how they are acquired in our embodied state. This shows that thought without phantasms is at least logically possible, even if it does not prove such thought will actually take place. Nifo, however, also reasons that there are two types of experience we have in this life that at least hint at the actual realisation of thought without phantasms. One arises from our experience of a free will, where we can intellectually want something different from what our bodily appetite desires. This shows that our intellect has a certain freedom from the body already in this life. The other and more interesting experience he refers to is our ability to understand the universal itself, and not just the universal in the particular—for example, when we think of humanity in general without having a particular human being in mind. Nifo takes this to imply that there are some thoughts that are (almost) free from recourse to phantasms already in this life.

In the final part of his rebuttal of Pomponazzi, Nifo discusses a series of difficulties connected to disembodied cognition. Among them is the question whether the separate intellect can learn something new without having the ability to form new concepts on its own, given that it no longer has any phantasm to abstract new concepts from. Although Nifo admits that according to Aristotle it cannot, he thinks that Aristotle was wrong on this point. Moreover he proposes that the possibility of disembodied learning is consistent with the broader Aristotelian framework.<sup>33</sup> The way Nifo deals with the various puzzles of disembodied cognition turns out to resemble Aquinas's treatment of the issues for the most part: in all such cases the intelligible species are directly infused in our disembodied intellect by angels. This process is made more plausible through the following analogy between the acquisition of species in this life and the next:

The soul is disposed in this life through the light of the agent intellect naturally to receive species from phantasms, and after death [it is

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32 For the history of the notion of intelligible species, cf. Spruit L., *Species intelligibilis. from Perception to Knowledge*, 2 vols. (Leiden – Boston: 1993–1995).

33 'Haec, licet probare non possim ex iis quae nostris sensibus subiacent, coniecturabiliter probari possunt et, sic probans, iis quae Aristoteles dicit non adversatur'. Nifo, *De immortalitate animae* 360.

disposed, *SdB*] through the divine light naturally to receive species from the superior substances.<sup>34</sup>

To summarise: Because of the distinction between soul *qua* soul and soul *qua* intellect, the fact that the soul as form of the body cannot think without a phantasm ultimately has few, if any, implications for the question of the immortality of the soul.<sup>35</sup> Although it is true, therefore, to say that while the soul is embodied it is necessarily connected to the sensory powers in general and the imagination in particular, we must be clear as to the type of necessity in question. The phantasms are not absolutely necessary. They are only necessary *per accidens*, and they are a mediate rather than an immediate cause.<sup>36</sup> What is absolutely necessary are the intelligible species, but whether these come to exist through abstraction from phantasms or via a direct influx from the separate intelligences does not matter for the soul *qua* intellect.

To the extent that Nifo is successful in rebutting Pomponazzi, it comes at a cost. What is lost in the many pages in which Nifo develops his arguments is the idea that phantasms make a positive contribution to human thought. True, they are a mediate cause for the production of intelligible species, while the soul is embodied, but that seems to exhaust their function. Whereas Aquinas had still claimed that embodied cognition is the preferred mode of human cognition, for Nifo embodied and disembodied cognition seem to be at least on par with one another. It does not matter in the slightest whether the intelligible species used in thought have been acquired through our own processes of abstraction or have been given to us by direct infusion.

One might argue that this lack of attention to the positive contribution of phantasms to human thought was to be expected. Nifo writes that he draws

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34 'Disponitur anima in vita lumine agentis intellectus ut naturaliter accipiat species a phantasmatis, et post mortem lumine divino ut naturaliter accipiat species a superioribus substantiis'. Nifo, *De immortalitate animae* 358. Compare Thomas Aquinas, *Summa Theologiae* 1a, q. 89, a. 7.

35 The only implication Nifo is willing to admit is that even in the case of the soul *qua* intellect, in which case phantasms are no longer required, the intellect must have been actualised by species at some point while it was still soul. Cf. Nifo, *De immortalitate animae* 96 and 274.

36 'Qua ratione, fit ut phantasma non sit necessarium tamquam causa immediata ad ipsum intelligere, ut arbitratur Pomponatius, sed tamquam causa mediata, quae concurrat ad generationem primi actus, quae est forma animae [...] Diximus enim phantasma esse necessarium per accidens, quia pro intelligere ipsius animae dum est in corpore'. Nifo, *De immortalitate animae* 270.

his inspiration for the distinction between soul *qua* soul and *qua* intellect from the Neoplatonist philosopher Simplicius of Cilicia (c. 480–c. 560 CE). The Neoplatonic tradition had always placed a strong emphasis on the independence of our intellect from our body, and paid little if any attention to the positive contribution of the images obtained through our senses. Although this a valid point, it remains true that Pomponazzi changed the terms of the debate on the role of imagination in cognition. In order to show this, I will turn now to one of the most important Aristotelians of the sixteenth century, the Jesuit philosopher Francisco Suárez. Although Suárez does not address Pomponazzi's texts directly, he can be fruitfully read as having tried to solve the same problem as raised so forcefully by Pomponazzi.<sup>37</sup>

### Francisco Suárez on Imagination

In his massive semi-commentary on Aristotle's *De anima* (published posthumously in 1621), Suárez discusses the role of the imagination and its phantasms in cognition several times, for instance, in the question of 'whether our intellect, in our current state, depends for its cognition on the cognition by imagination (*phantasia*)'. After discussing, and dismissing, the opinion that we only need phantasms to acquire intelligible species, and that, having acquired these, our intellect can function on its own, Suárez sides with what he calls the common opinion—namely, that our intellect cannot understand anything without recourse to phantasms. As Suárez puts it:

The soul, while it is in the body, has an intrinsic dependence on the imagination, that is, it cannot operate through the intellect unless it operates actually through a phantasm at the same time [...] Not because the phantasms themselves are understood, that is, are cognised, but because through them the imagination operates with the intellect simultaneously.<sup>38</sup>

37 J.B. South recently argued for the stronger claim that Suárez's views on the relation between intellect and imagination were shaped by Pomponazzi's challenge. Cf. South J.B., "Suárez, Immortality, and the Soul's Dependence on the Body", in Hill B. – Lagerlund H. (eds.), *The Philosophy of Francisco Suárez* (Oxford – New York: 2012) 121–136.

38 Suárez Francisco, *De anima*, III, d. 9, q. 7, 202, as quoted in South J.B., "Francisco Suárez on Imagination", *Vivarium* 39,1 (2001), 119–158, here 147 (with minor changes). The article contains an excellent philosophical analysis of Suárez's view that the intrinsic dependence of

Although Suárez speaks of an intrinsic dependency between the intellectual soul and imagination, whereas Nifo spoke of a necessary connection, it is clear that they mean the same thing: when it comes to embodied cognition, the imagination is crucial. To support his claim, Suárez repeats the two arguments from experience presented by Aquinas (see above, p. 16).<sup>39</sup> The link between imagination and the intellect is therefore a given. But accounting for the reason *why* human beings have been created with this necessary connection between imagination and intellect is a more difficult challenge for Suárez, since he rejects the reasons Aquinas gave. Aquinas had argued for the necessary connection between thought and phantasm from an epistemological standpoint, by stating that the proper object of the human intellect is the universal aspect embodied in the material singular. Given that our intellect, on account of its immateriality, has no direct access to the singular, we need phantasms to link our universal concepts to the material things we perceive. Suárez, however, rejects Aquinas's view of the proper object of the intellect, and argues instead that our intellect can know the singular directly. There is no *a priori* need for a phantasm from an epistemological point of view. Suárez also rejects the alternative explanation presented by John Duns Scotus (c. 1266–1308), who had argued that the necessary connection between imagination and intellect is accounted for by the order that exists between these two powers—namely, an order where, when one is active, the other will always also be active. As Suárez rightly states, this is not so much an argument that explains why we need phantasms, but rather a stipulation of a necessary connection, with no reason given.

Having rejected both accounts, Suárez proposes the following explanation instead, which is worth quoting in full:

Wherefore no more suitable and evident argument supports this [necessary connection between imagination and intellect, *SdB*] than that this dependence comes from the imperfection of our [current, *SdB*] condition. For at present our intellect only receives species when the imagination works; however, imagination and intellect are rooted in one and the same soul, and therefore serve each other and impede each other; for that reason, when the imagination is injured and acts crazily, it drags

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the soul's various cognitive powers on each other in this life is due to their being rooted in the same soul. All references to Suárez's commentary on Aristotle's *De anima* are to the critical edition published by Castellote S., *Commentaria una cum quaestionibus in libros Aristotelis "De Anima"*, 3 vols. (Madrid: 1978–1991).

39 Suárez, *De anima*, III, d. 9, q. 7, 204.

the attention of the soul with it as well as even the intellect. And therefore the injury flows over into the intellect. The perfection of imagination, however, is advantageous to the intellect, because the better the apprehension of the imaginative power, the better the species that are impressed into the intellect. Furthermore, when the intellect operates it moves and draws with it the imagination. And from here originates the association (*concomitantia*) of the operations of these powers, an association that is not essential, but proceeds from our [current, *SdB*] condition; for in the separated soul and in the bodies that rise again this dependence of the intellect on the imagination will not be present.<sup>40</sup>

Although Suárez is generally sympathetic to the views of Aquinas, the many changes he introduces notwithstanding, here he takes an approach that Aquinas could never have agreed with. The fact that our intellect cannot function without the imagination in our current embodied state is explicitly attributed to the imperfection of our current state. Neither the separated soul nor the soul that has acquired the glorified body after its resurrection has any use for phantasms. Nor does the lack of phantasms in these two states impede the intellect in any way, as becomes clear in the fourteenth disputation of the third book, which is dedicated entirely to the soul in its separated state. There, Suárez argues that phantasms are needed only because the soul in its embodied state is bound to sensation, and they are no longer needed in a disembodied state:

The reason is clear: for the soul is the principle of understanding, and the things understood, together with the intelligible species, remain within it; hence nothing is lacking for it to understand. You say: sense is lacking, on which cognition depends. But on the contrary: [the soul, *SdB*] does not depend on sense as an organ, but on sense as that which supplies

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40 'Quocirca nihilominus nulla concurrit commodior et evidentior ratio, nisi quod haec dependentia provenit ex imperfectione status, nam intellectus nunc non recipit species, nisi dum actu operatur phantasia; phantasia autem et intellectus radicanter in eadem anima et ideo sibi invicem deserviunt et sese impediunt; et ideo dum phantasia laeditur et insanit secum trahit attentionem animae, atque adeo intellectum; et ideo laesio redundat in intellectum. Perfectio etiam imaginationis prodest intellectui, quia quando melior est apprehensio imaginativae, tanto meliores species imprimuntur in intellectum; et intellectus etiam operans movet et secum trahit imaginationem. Et hinc ergo oritur concomitantia operationum harum potentiarum, quae non est essentialis, sed ex statu provenit, nam in anima separata et in corporibus resurgentibus non erit haec dependentia intellectus a phantasmate'. Suárez, *De anima*, III, d. 9, q. 7, 206–208.

species in this life, because of an association of operation. This association, however, is not essential to the intellect, but happens to it while it is in the body on account of the actual association of these powers [i.e. sensitive and intellective, *SdB*]. Nevertheless, when the sensitive powers are taken away, this dependency is no longer there.<sup>41</sup>

For Suárez, the most perfect state for the human soul is a state in which it is able to have a clear cognition of things, and for a clear cognition we need the best intelligible species possible. Hence his view that the separated soul's cognition is in no way inferior to the embodied soul's cognition. In fact, it is superior.<sup>42</sup> First, because our soul in its disembodied state can know several things that it could not in its embodied state. For instance, it has a much clearer form of self-knowledge; it has direct cognitive access to the immaterial angels; etc. Second, because it has an even better understanding of the things it already knew or could have known when embodied. This is because in its separated state, it is not distracted by bodily phenomena and it receives intelligible species of a higher quality.

For Aquinas, by contrast, the most natural state for the soul, indeed the *only* natural state for the soul, is a state in which it is embodied. Since its natural state is being embodied, its natural mode of cognition is also one that is embodied; disembodied thought, although possible, is less clear and less perfect than embodied thought.<sup>43</sup> The soul's immortality notwithstanding, its separation from the body is unnatural and can as such only be temporary. This is precisely why the soul will eventually become embodied again, this time in the glorified body.<sup>44</sup>

41 'Et ratio est evidens: Anima enim est principium intelligendi et in ea manent intellectus cum speciebus intelligibilibus; ergo nihil deest ut possit intelligere. Dices: deest sensus a quo in cognitione pendet. Sed contra: nam non pendet ab illo ut ab organo, sed ut a ministrante species in hac vita et propter quamdam concomitantiam operationum; hoc tamen non est essentiale intellectui, sed accidit illi dum est in corpore propter actualem colligationem istarum potentiarum, tamen, ablatis potentiis sensitivis, non manet haec dependentia'. Suárez, *De anima*, III.14.3, 468.

42 'Prima conclusio: Absolute loquendo melius intelligit anima separata quam coniuncta'. Suárez, *De anima*, III, d.14, q. 8.

43 Suárez correctly presents Aquinas's position, but finds it implausible. 'Sic contingit hic: anima nostra est in infimo gradu intellectualium et connaturale est illi cognoscere per species imperfectas et per sensus acceptas ut per illas habere possit propriam et distinctam cognitionem; et ideo si extra hunc statum feratur, et illi infundantur species superioris rationis, excedet capacitatem suam nec poterit per illas distincte intelligere. Haec tamen sententia est valde dubia'. Suárez, *De anima*, III, d. 14, q. 7, 516.

44 This aspect of Aquinas's thought is often neglected. But cf. Pegis A.C., "Between Immortality and Death: Some Further Reflections on the Summa contra gentiles", *The Monist* 58 (1974), 1–15, Wippel J.F., "Thomas Aquinas on the Separated Soul's Natural Knowledge", in McEvoy J. – Dunne M. (eds.), *Thomas Aquinas. Approaches to Truth* (Dublin: 2002),



Even though Suárez, just like Nifo, managed to safeguard the immortality of our soul, he did so at the cost of nearly eliminating the distinction between human souls and angelic minds. Or, in other words, at the cost of weakening the soul-body unity to such an extent that he is but a very small step away from a mind-body dualism. Whereas in Nifo, embodied and disembodied thought were considered to be on a par with one another, Suárez takes the further step of elevating disembodied cognition to the preferred mode, at least in terms of accuracy.

### Concluding Remarks

This, then, is the intellectual legacy of Pietro Pomponazzi. Once it was shown that the Aristotelian biological framework cannot support an immortal soul—and that imagination therefore cannot function as the knot that binds embodied sensation with disembodied intellection together—dualism and materialism would in time become the only remaining plausible alternatives. The choice between the two depended on whether or not one was convinced of the immortality of the soul. In other words, one could either move in the direction of a Cartesian or a Hobbesian approach.<sup>45</sup> If one took the first route, it was more than tempting to consider imagination as something non-essential. As René Descartes was to phrase it in his *Meditations*: ‘I consider that this power of imagining which is in me, differing as it does from the power of understanding, is not a necessary constituent of my own essence, that is, of the essence of my mind’.<sup>46</sup> If one took the second route, by contrast, the distinction between imagination and other forms of cognition tended to collapse, which is why Thomas Hobbes could reach the conclusion that ‘a thing “in the intellect” and an imaginary thing are the same’.<sup>47</sup>

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114–140, and Pasnau R., “Philosophy of Mind and Human Nature”, in Davies B. – Stump E. (eds.), *The Oxford Handbook of Aquinas* (Oxford – New York: 2012) 348–368.

45 See the other papers in this volume.

46 Descartes, René, “Meditations on First Philosophy”, in Cottingham J. – Stoothoff R. – Murdoch D., *The Philosophical Writings of Descartes*, 3 vols. (Cambridge – New York: 1984–1991) vol. II, 51. Note that imagination nevertheless plays an important role in Descartes’s philosophy. Cf. Schouls P.A., *Descartes and the Possibility of Science* (Ithaca: 2000), and Sepper D.L., *Descartes’s Imagination. Proportion, Images, and the Activity of Thinking* (Berkeley: 1996).

47 Hobbes Thomas, *Thomas White’s De mundo Examined*, transl. Jones H.W. (London – Beccles: 1976), IV.1, 52. Cf. also Leijenhorst C., “Sense and Nonsense about Sense: Hobbes and the Aristotelians on Sense Perception and Imagination”, in Springborg P. (ed.), *The Cambridge Companion to Hobbes* (Cambridge – New York: 2007) 82–119, esp. 96–98.

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# ***‘Imaginatio’ and Visual Representation in Twelfth-Century Cosmology and Astronomy: Ibn al-Haytham, Stephen of Pisa (and Antioch), (Ps.) Māshā’allāh, and (Ps.) Thābit ibn Qurra***

*Barbara Obrist*

## **The Early Middle Ages and the Turn of the Twelfth Century**

Both mathematical astronomy and natural philosophy had virtually disappeared by the beginning of the Middle Ages, or by the time Isidore, bishop of Seville (ca. 560–636 CE), compiled his authoritative *On the Nature of Things* (ca. 603 CE). In the domain of astronomy, speculative activities involving the elaboration of hypotheses and geometrical demonstrations were no longer pursued. Instead, astronomers engaged in summary descriptions of the structure of the world and equally summary explanations of celestial phenomena such as lunar and solar eclipses. Corresponding visual figures, no longer crucial to geometrical demonstrations, became dispensable. When they were included in or added to verbal expositions, this was primarily in order to summarise and enhance what had previously been explained. Generally speaking, the transmission of an acquired body of knowledge, with its particular methods and styles of exposition, superseded both philosophical speculation about the universe and the explanation of diverse celestial phenomena in terms of hypothetical, imaginary geometrical constructs.

Nevertheless, several Roman cosmographical and astronomical handbooks that were influential in the early Middle Ages preserved the memory of how to explain celestial phenomena with the help of imaginary models of the universe. When discussing lunar eclipses in his *Astronomy*, for example, Hyginus (fl. 1st century BCE–1st century CE) has his reader, or audience, form mental pictures of circles and lines, an activity he describes in the conditional:

A lunar eclipse takes place when the moon is on the same diameter as the sun when it has disappeared below the earth, such that, were you to draw

a straight line through the center of the earth, it would connect the sun below the earth and the moon above the earth.<sup>1</sup>

The same type of exposition is used in the course of rejecting the opinions of those who wrongly believe that the sun is on the same level as the zodiacal constellations, or even above it, before laying out what is deemed the true explanation. After having pointed out that neither the sun nor the moon nor the planets are close to the fixed stars, as a number of people imagined (*finxerunt*),<sup>2</sup> Hyginus puts forth a theory that he himself endorses by having his reader again draw a mental figure, in this case composed of concentric circles that represent the trajectories of the planets from the moon upwards:

Suppose one were to make circles within the zodiacal circle and to imagine an interval such that the earth be located in the middle, and to take from the earth to the moon the measure which the Greeks named 'tone' [...]. By way of this theory you are able to know that neither the sun nor the moon reaches the stars, while nevertheless circling through the zodiacal circle.<sup>3</sup>

Another very influential, late antique astronomical text, Book VIII of Martianus Capella's (fl. c. 410–430 CE) encyclopedic *Marriage of Philology and Mercury*, echoes what must originally have been debates about the relation between the physical and the mathematical approaches to astronomy, including the conception of imaginary geometrical objects. Like Hyginus, Martianus Capella refers to this kind of mental activity as '*fingere*'. Having defined the universe as a body consisting of elementary layers, he asserts that the words 'axis,' 'poles,' and 'celestial circles' do not denote actual distinctions in the sky, but merely divisions that correspond to spatial intervals.<sup>4</sup> Then, when referring to

1 Hyginus, *De Astronomia*, ed. and transl. Le Boeuffe A. (Paris: 1983) vol. IV. 14. 3: 'Lunae autem eclipsis sic evenit, cum prope una dimensione sit luna, cum abierit sol sub terram, dumtaxat hoc modo ut per mediam terram, si quid directum traieceris, contingere possit solem sub terra, lunam autem supra terram [...].'

2 Ibid., vol. IV. 14. 4.

3 Ibid., vol. IV. 14–5: 'Ut si quis intra circulum zodiacum fecerit circulos et eos hoc intervallo finxerit ut terra sit in medio, et a terra unam mensionem fecerit ad lunam, quam Greci τόνον appellaverunt [...]. Hac igitur ratione potes scire neque solem neque lunam contingere stellas et nihilominus per zodiacum circulum verti'.

4 Martianus Capella, *De nuptiis Philologiae et Mercurii*, ed. Willis J. (Leipzig: 1983) vol. VIII, 815.

a material image of the universe, namely, an armillary sphere, he specifies that the term 'circles' designates the rise and setting of planets rather than corporeal demarcations.<sup>5</sup>

The celestial circles in question are the standard five parallel circles, the two colures, the oblique circles of the Zodiac, the Milky Way, and the horizon. Martianus Capella's personified *Astronomia* relates how, sometime in the past, she outlined in her mind divisions on the outermost sphere—that is, how she mentally established intervals between parallel celestial circles by sketching points, lines, and circles following a geometrical procedure. Thus, in order to posit the Arctic Circle, *Astronomia* made two points for drawing a circle, one marking the center and the other the circumference. At the pole of the universe, where she positioned the polar star, she set a compass point and drew a line to the head of the Dragon, and then proceeded to trace a first circle.<sup>6</sup>

Both Hyginus and Martianus Capella refer to geometrical constructions and occasionally use the verb '*fingerere*,' not in order to conceive new explanatory models, but to convey the knowledge of generally accepted doctrines. Accordingly, their expositions correspond to rhetorical procedures where persuasiveness is achieved by, for example, impressing the pictures of absent or, as in the present case, fictional geometrical objects upon the reader's mind by having him mentally follow the process of drawing imaginary figures. This procedure may be understood as the ultimate *ekphrasis*: not only is the absent picture described so as to create its *phantasia*, or mental vision, but on occasion the reader, or audience, is also encouraged to draw a mental picture.<sup>7</sup>

Other Roman authors of cosmographical accounts showed an interest in actual figurations, replacing references to imaginary figures with instructions for drawing diagrams on a material surface. Thus, taking up the question of the apparent and the real position of the sun and of the other planets in relation to the zodiacal circle, Macrobius, in his *Commentaries on the Dream of Scipio* (first decades of the fifth c. CE), uses a visual figure to explain how it happens that the planets are said to pass through the signs of the zodiac.

5 Ibid., vol. VIII, 815: 'Nos igitur circulos non ita dicemus, ut liquentis naturae discrimina corpulenta fingamus, sed ut ascensus descensusque ad nos errantium demonstremus'.

6 Ibid., 827: 'Ac prius ad septentrionalis circuli redeam granditatem, in quo more geometrico duo primo signa composui ad circulum perducendum, id est unum quod centron, aliud quod peripherian demonstraret. Itaque in ipso mundi cardine posui clarius sidus atque ab eo ad Draconis caput [...] lineam duxi [...]'.  
 7 See the studies in the volumes Lévy C. – Pernot L. (eds.), *Dire l'évidence. (Philosophie et rhétorique antiques)*, Cahiers d'histoire de la philosophie et de philosophie du langage, n° spécial (Paris: 1997) and Armisen-Marchetti M. (ed.), *Démonstrare? Voir et faire voir: formes de la démonstration à Rome*, Pallas 69 (Toulouse: 2005).

The figure in question is first said to summarise what had previously been described, and then to serve as an aid in understanding what causes the unequal lengths of the planets' courses through the zodiac. Instructions for drawing a lettered figure follow. They include the twelve zodiacal signs on the circumference of the circle and the inner, concentric planetary circles, which are laid out around the central earth.<sup>8</sup> In this particular context, the visual figure is instrumental both in apodictically demonstrating that the planetary spheres are beneath the celestial sphere, and in describing the movements of the planets.

Following these and some other Roman handbooks, authors of the early Middle Ages, especially from the turn of the ninth century onward, tended to present central cosmological doctrines and opinions as facts, and even as obvious facts. Occasionally, these were accompanied by *a posteriori* proofs, either by way of thought experiments, as in Hyginus's *Astronomia* or, more frequently, by way of experience-based proofs. But whatever style of argumentation Roman or early medieval cosmographers chose to adhere to, they showed little interest in reproducing geometrical demonstrations. Rather, they relied on persuasive procedures for transmitting results of former demonstrations, with or without the help of visual figures.<sup>9</sup>

All in all, during the first centuries of the Middle Ages, the cosmographical genre came to dominate in lieu of specialised physical and astronomical studies. Within this genre the universe was described in a non-mathematical fashion and, as hypothetical geometrical accounts about the universe receded into the background, summary physical explanations came to prevail. Pursued primarily in monastic and clerical contexts, astronomy was rudimentary and practice-oriented. Astronomical texts dating from that period are centered on the identification of constellations and the knowledge of their times of rise

8 Macrobius, *Commentarii in Somnium Scipionis*, ed. and transl. Armisen-Marchetti M., 2 vols. (Paris: 2003) vol. I, 21, 3; 3–5; for the figure, cf. 122: 'Et quia facilius ad intellectum per oculos via est, id quod sermo descripsit visus adsignet'.

9 Obrist B., "Visual Figures of the Universe between Antiquity and the Early Thirteenth Century", *Spontaneous Generations. A Journal for the History and Philosophy of Science* 6 (2012) 15–23; ead., "Démontrer, montrer et l'évidence visuelle: les figures médiévales de l'univers, de l'Antiquité à Guillaume de Conches et au XIII<sup>e</sup> siècle", in Lutz E.C. – Jerjen V. – Putzo C. (eds.), *Diagramm und Text. Diagrammatische Strukturen und die Dynamisierung von Wissen und Erfahrung* (Wiesbaden: 2014) 45–78; ead., "The Idea of a Spherical Universe and its Visualization in the Earlier Middle Ages (seventh – twelfth c.), forthcoming in *The Visualization of Knowledge in Medieval and Early Modern Europe*, Conference, Jerusalem, Israel Institute for Advanced Studies, June 6–9, 2016.

and setting, with theoretical expositions reduced to schematic accounts and renderings of the principal celestial circles, verbal and pictorial.

The twelfth-century witnessed a profound change in astronomy and cosmology, when philosophy of nature reemerged and Greek and Arabic astronomical texts were translated into Latin. However, cosmographical accounts continued to prevail, whether in translation or in the form of newly composed Latin treatises. Indeed, while the importance of geometry was generally acknowledged, few authors were able to pursue mathematical astronomy. Neither Ptolemy's works nor other mathematical Greek and Arabic astronomical texts that were translated into Latin during the twelfth century had much of an immediate impact. Aside from the inclusion of some planetary astronomy, twelfth-century descriptions of the universe differed from older ones above all in that they exhibited a higher level of technicality. Geometrical representations of the universe were described in more detail; corresponding demonstrations were summarised; and the expression '*figura geometrica*' occasionally replaced the otherwise prevailing terms '*figura*' and '*descriptio*', even in contexts where they had a purely illustrative function.<sup>10</sup> Also, '*demonstratio geometrica*', which implied the idea of a truly scientific, deductive proof, was introduced to set it apart from a '*demonstratio*' that simply illustrated a previously made statement either verbally, pictorially, or both. It was in this context that the terms '*imaginatio*' and '*imaginar*' made their appearance in Latin astronomical texts.

In light of these observations, a tentative overview of those twelfth-century astronomical documents that refer to imagination and to imaginary geometrical models of the spherical universe, as well as to corresponding two- or three-dimensional material images, is in order. While historians have paid much attention to the concept of imagination in relation to theories of knowledge, references to this mental faculty and activity in twelfth- and early thirteenth-century astronomical expositions have been neglected. Besides testifying to

10 For an early twelfth-century example, see Petrus Alfonsi, *Dialogus Petri cognomento Alphonsi ex Iudaeo Christiani et Moysi Iudaei*; *Patrologia Latina*, 157, col. 537–672; 547 B: 'Geometrica figura hoc [the habitable zone] mihi monstrari visibiliter cupio quoniam de hac re diversas gentes ex librorum scriptis diversa sensisse non dubito'. Further, *Liber de orbe*, ch. 11, *De accessu et recessu maris per lunam et de operibus ipsius in rebus humidis*: 'Ad ostendendum vero marium accessus et recessus figuram geometricam componam'; ch. 17, *De solis diversis ascensibus et occasibus super diversas regiones*: 'Ad quod evidentius cognoscendum ac percipiendum in figura geometrica has regiones ponam [...]'; Florence, Biblioteca nazionale, MS Conv. Soppr. J. I. 132, f. 5ra; f. 8ra (s. XIII in.). For this long version of *De orbe*, which circulated in the 1400s, cf. Obrist B., "William of Conches, Māshā'allāh, and Twelfth-Century Cosmology", *Archives d'histoire doctrinale et littéraire du Moyen Age* 76 (2009) 29–88. For its short, printed version, cf. *infra*, note 38.



the use of the concept of imagination by authors of astronomical expositions, these texts are also of special interest in that several of them add actual figures to previously described imaginary representations of the universe, while the transition from imaginary to actual, material figures is not a subject readily addressed in theoretical expositions on cognition.

These hitherto little studied documents include both cosmographical and more technical astronomical expositions, most of which became known to the Latin world toward the mid-twelfth century. They fall into two main groups, the first being represented by Ibn al-Haytham's *On the Configuration of the World* (*De figura mundi*), and the second consisting of variant versions of a text that describes what originally must have been a material three-dimensional image of the universe, an armillary sphere. One of these versions came to be known through the *Liber de orbe*, attributed to Māshā'allāh (fl. late eighth c.) in the late twelfth-century list of Gerard of Cremona's translations. Another version is to be found in the *De imaginatione spere et circulorum eius* (or *De recta imaginatione*), attributed to Thābit ibn Qurra in its thirteenth-century manuscripts. Finally, a third text of this type has been integrated into a practice-oriented document, a set of rules and explanations about astronomical tables.

### The Twelfth Century: *De figura mundi* and *Liber Mamonis*

Primary among the major cosmographical documents translated from the Arabic to contain frequent references to '*imaginatio*' and '*imaginar*' is the *Treatise on the Configuration of the World* (*Maqālah fī hay'at al-ʿālam*) by Ibn al-Haytham.<sup>11</sup> José Millás Vallicrosa published one of the three translations from the Arabic, based on a Madrid manuscript, as *De figura mundi*.<sup>12</sup> While the author and the precise date of this translation remain unknown, a second

11 Langermann Y.T. (ed. [Arabic] and transl.), *Ibn al Haytham's On the Configuration of the World* (New York – London: 1990). Roshdi Rashed suggested that the author of this work was Muḥammad ibn al-Ḥasan ibn al-Haytham (active in Baghdad ca. 1026–1028), rather than al-Ḥasan ibn al-Ḥasan ibn al-Haytham: *Les mathématiques infinitésimales du IX<sup>e</sup> au XI<sup>e</sup> siècle. Ibn al Haytham*, London: 1993 vol. II, esp. 13–14.

12 Madrid, Biblioteca nacional, MS 10059 (s. XIII/XIV). The title is derived from the beginning of the text: 'Mundus est nomen ponitum, et dicitur super totum ens. Figura totius mundi est spherica [...]' (Vallicrosa J.M. Millás (ed.), in *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo* (Madrid: 1942) Appendix II, "Tratado de astronomía de Al-Ḥasan ben Al-Ḥayṭam, en traducción latina desconocida" 285–312, here: 285.

translation, or adaptation, was made during the reign of Alfonso X (1221–84).<sup>13</sup> The third translation, which will be of special concern here, is rather different from the Madrid version and was established by Stephen of Pisa (and Antioch) sometime during the second quarter of the twelfth century. Stephen added an extensive commentary and provided this new treatise with the title *Liber Mamonis*.<sup>14</sup> Extant in a single incomplete twelfth-century copy that includes visual figures,<sup>15</sup> the *Liber Mamonis* is a treatise in four books that follows Ibn al-Haytham in combining Ptolemy's mathematical approach of the *Almagest* with a physical perspective.<sup>16</sup> Indeed, in *On the Configuration of the World* Ibn al-Haytham aimed to bring together what he termed the abstract, imaginative constructs of the mathematician and the physical concept of bodily spheres, thereby indirectly following Ptolemy's *Planetary Hypotheses*.<sup>17</sup>

- 13 Mancha J.L., "La version alfonsi del *fi hay'at al-'alam* (*de configuratione mundi*) de Ibn al-Haytham (Oxford, Canon. Misc. 45, ff. 1r–56r)", in Comes M. – Mielgo H. – Samsó J. (eds.), "*Ochava espera*" y "*astrofísica*": *textos y estudios sobre las fuentes Árabes de la astronomía de Alfonso X* (Barcelona: 1990) 133–207. For this, as well as a sixteenth-century translation, cf. Langermann, *Ibn al Haytham's On the Configuration of the World* 40–41. Aside from the Latin manuscripts mentioned by Langermann, there is also: Lüneburg, Ratsbücherei, Misc. D2° 13 (s. XIV ex.). I owe this reference to Dr. David Juste (Munich).
- 14 The relation between Stephen and the *Liber Mamonis* was first established by Haskins Ch. H., *Studies in the History of Mediaeval Science* (Cambridge: 1927) 131–135; further, Hunt R.W., "Stephen of Antioch", *Mediaeval and Renaissance Studies* 2 (1950) 172–173; Burnett C., "Abd al-Masih of Winchester", in Nauta L. – Vanderjagt A. (eds.), *Between Demonstration and Imagination. Essays in the History of Science and Philosophy Presented to John D. North* (Leiden – Boston – Cologne: 1999) 159–167; 162; id., "Antioch as a Link between Arabic and Latin Culture in the Twelfth and Thirteenth Centuries", in Draelants I. – Tihon A. – Van Den Abeele B. (eds.), *Occident et Proche-Orient: Contacts scientifiques au temps des Croisades* (Turnhout: 2000) 1–78; 10–13.
- 15 Cambrai, Médiathèque, MS 930.
- 16 Richard Lemay made a first commented transcription of the *Liber Mamonis*. This has since been replaced by Grupe D. (ed. and transl.), *The Latin Reception of Arabic Astronomy and Cosmology in Mid-Twelfth-Century Antioch. The Liber Mamonis and the Dresden Almagest*, Ph.D. dissertation (University of London – The Warburg Institute: 2013), forthcoming: Springer Verlag GmbH, Berlin. In this edition of the Latin text and in the corresponding English translation of Ibn al-Haytham's *On the Configuration of the World*, Stephen of Pisa's additions are printed in bold characters. I am grateful to Dr. Grupe for having made available his edition and translation of the *Liber Mamonis*. Unless indicated otherwise, I follow Grupe's translation. Burnett edited and translated Stephens' prefaces in "Antioch as a Link between Arabic and Latin Culture" Appendix I, 20–60.
- 17 Cf. Langermann, *Ibn al Haytham's On the Configuration of the World* 11–25; Sabra A.I., "Configuring the Universe: Aporetic, Problem Solving, and Kinematic Modeling as Themes of Arabic Astronomy", *Perspectives on Science* 6.3 (1998) 288–330; esp. 294–297.

Claiming that points cannot move in a circle unless they are attached to a body, he criticised mathematicians for having based their theories about 'the form of the figure and the laws of the motions [...] upon the motions of imaginary points on the circumferences of intellected circles according to what is demonstrated in those books of theirs which we have'.<sup>18</sup> In his own description of the universe, Ibn al-Haytham accepts as true Ptolemy's abstract mathematical hypotheses, or imaginary models, for explaining celestial movements. But he goes beyond the *Almagest* in relating them to the surfaces of the solid, bodily spheres of the natural philosopher, the existence of which he takes as equally established.<sup>19</sup> Accordingly, throughout *On the Configuration of the World*, Ibn al-Haytham refers to celestial circles in terms of imaginary, yet accepted circles, whether they are used to determine the structure of the universe or to help account for the movements of stars.

Stephen of Pisa endorses Ibn al-Haytham's method of combining accepted mathematical hypotheses with physical theories.<sup>20</sup> However, while the latter adopts a purely descriptive approach, the twelfth-century Latin commentator reinforces the Ptolemaic mathematical tradition by adding astronomical sections that include critiques of Ibn al-Haytham especially in relation to planetary movements.<sup>21</sup> He frequently refers to imaginary circles and lines both in his descriptive accounts and in his more technical astronomical sections. At one point, he blames the author of the text he follows, 'a certain Arab', for his erroneous assessment of the number of spheres, and announces a corresponding demonstration.<sup>22</sup> In the same passage Stephen is also critical of scholars of the Latin world because they are ignorant of geometrical proofs; for instance,

18 Ibn al Haytham, *On the Configuration of the World*, ch. 1, *Introduction*, § 2 (Langermann transl. 53).

19 Ibid., ch. 1, *Introduction*, § 6 (Langermann transl. 54). For al-Ḥasan ibn al-Ḥasan ibn al-Haytham's rejection of these hypotheses in the treatise *Dubitations on Ptolemy*, where imagination is said to produce false models, see Sabra A.I., "An Eleventh-Century Refutation of Ptolemy's Planetary Theory", in Hilfstein E. – Grande F.D. (eds.), *Science and History. Studies in Honor of Edward Rosen*, Studia Copernicana 16 (Wrocław: 1978) 117–131, esp. 121–122, n. 13.

20 Stephen of Pisa, *Liber Mamonis*, I, A.1 <Preface>, lines 40–45 (Grupe, *The Latin Reception* 153): 'Placet igitur celestium sperarum circulos, numerum, ordinem [...] aperire, ut qui a Ptholomeo in sua Sinthasi disponuntur circuli in speris etiam quomodo possint inveniri laborantibus hac arte via teratur'.

21 Grupe D., "Stephen of Pisa's Theory of the Oscillating Deferents of the Inner Planets (1h. 12thc.)", *Archive for History of Exact Sciences* 71 (2017) 379–407.

22 Stephen of Pisa, *Liber Mamonis*, IV, A.4, lines 5–12 (Grupe, *The Latin Reception* 245); on the question of the number of spheres and the edition and translation of corresponding

since even its most astute representatives were unable to find the true—in the sense of geometrically executed—explanation for the phenomenon of planetary retrogradation, they resorted to a fantastical and false physical explanation, namely that of the an imaginary force of solar rays, “as if the sun’s rays could be more powerful than the eternal courses of the spheres on which the planets move”.<sup>23</sup>

The initial sections of *On the Configuration of the World*, as translated by Stephen, may serve to illustrate how Ibn al-Haytham combined geometrical and physical definitions and topoi, and in the process referred to imagination. In Chapter Two, *The Whole World*, the sphere is said to be a ‘corporeal form’ encompassed by a surface. When it comes to describing and defining the form of this body, this is done in terms of an imaginary geometrical construct

[...] in the middle of which [the sphere] there is a point [such as] if several lines were to issue from it in diverse directions and to end on the encompassing surface of the sphere, they would be of equal and identical lengths. The learned named this point the center of the sphere.<sup>24</sup>

The subsequent passage specifies that the world is a solid body, a form that has the aspect of a sphere. And if, ‘from the middle point to its surface, you were to draw imaginary lines, you would notice that all of these are of equal length. For it is said that a point is the center of the world’.<sup>25</sup>

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passages, see esp. Grupe, “Stephen of Pisa’s Theory of the Oscillating Deferents of the Inner Planets”.

- 23 Ibid., IV, A.4, lines 30–42 (Grupe, *The Latin Reception* 245): ‘Nec hoc mirum ducimus cum occulta sit res et geometricalibus exquisita et approbata argumentis quorum latinitas inscia in divulgato diu multumque volutatur errore. Cum enim astutiores horum propositi rei veritatem nulla possent invenire ratione, fictum quoddam et violentum solis radiis concesserunt dicentes eorum maiori impulsu retrogrados fieri planetas quasi possint amplius solis radii quam ipsarum in quibus volvuntur sempiterni cursus sperarum. Verum id quam frivolum sit facili patebit argumento’.
- 24 Ibn al-Haytham, *De figura mundi*, Stephen of Pisa transl., in *Liber Mamonis*, I, A.1.1 <ch. 2, *The Whole World*>, § 13, lines 3–10 (Grupe, *The Latin Reception* 154): ‘Forma eius [mundus] rotunda atque speralis est. Spera autem, ut a maioribus accepimus, corporalis forma est quam circuit superficies, cuius in medio punctus est a quo in diversa tendentes si egrediantur plures lineae que terminantur in eiusdem spere superficie equalem eandemque omnes longitudinem sortiuntur. Huius puncti nomen sapientes centrum spere posuerunt’.
- 25 Ibid., I, A.1.1 <ch. 2, *The Whole World*>, § 14, lines 10–15 (Grupe, *The Latin Reception* 154): ‘Mundus igitur est solidum corpus, forma eius figura spere, quem circuit una equalis rotundaque superficies. In medio enim eius punctus de quo ad superficiem usque

Chapter Three, *The Orb*, gives a general description of the cosmic sphere. It describes nine heavenly spheres and the movements of these nine concentric celestial bodies around their poles.<sup>26</sup> The spheres in question are the seven planetary spheres, the sphere of the fixed stars and finally the 'highest and last heaven' or 'great heaven'. The chapter then takes up the argument of the introductory section of the treatise—namely, that points moving on the surface of a sphere trace imaginary circles, and in so doing refers to a "Book of Geometry":<sup>27</sup>

All spheres of the heaven rotate, as we have said, around two fixed poles in a constant circular motion, and by their motion every point on their surface describes an imaginary circle in its observed position and on the surface of the sphere. On that circle the same point revolves steadily without any deviation. The validity of this common statement is proved by most truthful arguments in the *Book of Geometry*. For every plane that divides and delimits adjoining spheres produces a circle on any of them. And so, as the spheres move around fixed poles, every point on their surface draws a circle, hence the central point of every star that is located on them will produce a circle. If you imagine the plane of that circle magnified until it cuts through the whole world, it will produce an imaginary circle on the surface of the high heaven. For if we imagine a plane on a line that runs through the center of a star and the center of the world to be extended such as it divides the whole world, this section will produce

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quocumque imaginarias duxeris lineas, equales eas advertes longitudine. Punctus autem hic centrum mundi esse dicitur.

- 26 Ibid., I, A.1.2 <ch. 3, *The Orb*> (Grupe, *The Latin Reception* 164). Stephen's translation omits § 39 of Ibn al-Haytham's corresponding chapter, which discusses the diverse meanings of 'orb'. Cf. Ibn al-Haytham, *On the Configuration of the World*, ch. 3, *The Orb* (Langermann transl. 69).
- 27 Ibn al-Haytham, *De figura mundi*, Stephen of Pisa transl., in *Liber Mamonis*, I, A.1.2 <Ch. 3, *The Orb*>, § 49, lines 1–2 (Grupe, *The Latin Reception* 167); *De figura mundi*, in MS Madrid, Biblioteca Nacional, MS 10059: "[...] uniuscuiusque spere mote super duos polos omnes puncti significant circulos in superficie spere et iam declaraverunt hoc geometre in libris eorum [...]" (Vallicrosa ed., 287; comp. Langermann transl., 70); the reference might have been to Autolycos' *The Moving Sphere*, ed. and transl. Aujac G. (Paris: 1975). For the Latin translation: Mogenet J. (ed.), "La traduction latine par Gérard de Crémone du *Traité de la Sphère en Mouvement* d'Autolycos", *Archives d'histoire des sciences*, 28 (1948) 139–64. This text was part of a series of originally Greek treatises, which were used as an introduction to Ptolemy from the ninth century onward; cf. Morelon R., "General Survey of Arabic Astronomy", in Rashed R.-Morelon R. (eds.), *Encyclopedia of the History of Arabic Science* (London, New York: 1996) vol. 1, 1–19; 7.

a great circle on the surface of the high heaven, whose center coincides with that of the world [...] In that way there will be many imaginary circles on the surface of the high heaven, taking their origin in any kind of imagination of what we have said.<sup>28</sup>

Hence the text of *On the Configuration of the World* as translated into Latin by Stephen of Pisa. Stephen's own developments, which precede this passage, are of special interest in that they include a reflection on the epistemological status of imaginary circles in astronomical studies. Stephen establishes, on the one hand, a relation between probable, or likely, knowledge in the domain of imagination and, on the other, necessary knowledge of those things that 'subsist according to the nature of things:'

But now we will look into the origin of the circles, their position, and necessary knowledge. None of the circles which we will be discussing in this book subsist in heaven by the nature of things; rather, they are imaginary. For the human mind has the marvelous faculty to conceive by imagination that which is not, thereby preparing with [the help of] the verisimilar the way to an understanding of that which is. In order, therefore, to investigate the hidden and intricate position of the celestial spheres, to know the place and the size of the sun and of the other stars on the surface of the heavenly spheres, the ancients imagined circles, the functioning of which the penetrating power of the soul, upon wishing [to do so], recognised. They are to be imagined as follows.<sup>29</sup>

28 Ibn al-Haytham, *De figura mundi*, Stephen of Pisa transl., in *Liber Mamonis*, I, A.1.2, <ch. 3, *The Orb*>, § 49–50, lines 57–62; 1–11; 18–20 (Grupe, *The Latin Reception* 166–167): 'Celi spere omnes in duobus moventur, ut positum est, fixis polis in certum circularemque motum, que dum moventur earum quisque punctus qui in superficie est facit in discursus loco atque in superficie spere quemdam imaginarium circulum per quem et in quo idem semper punctus nullatenus declinans volvitur sperali motu. Id ita esse ut aiunt verissimis ostenditur in *libro geometrie* rationibus. Unaqueque etenim superficies que speras invicem iunctas dividit et terminat facit in singulis earum circulum. Quoniam igitur cum spere moventur super fixos polos, quisque punctus in earum superficie circulum circinat, faciet unaqueque stellarum que in eis sunt in spera circulum per suum centrum. Huius circuli si imaginaveris augmentari superficiem usque dum totum secet mundum et dividat, faciet superficie alti celi imaginarium circulum [...]. Erunt igitur in hunc modum in superficie alti celi multi imaginarii circuli, quorum origo a qualibet horum que dicte sunt sumitur imaginatione'.

29 Ibid., I, A.1.2, <ch. 3, *The Orb*>, § 49–50, lines 43–57 (Grupe, *The Latin Reception* 166 [our more literal translation]): 'Nunc autem de circulorum origine eorumque situ et

The reminder of the chapter describes the principal imaginary great circles that structure both the surface of the outer celestial sphere and the surface of the earth, the equatorial circle, the horizon, and the meridian. The circle representing the ecliptic is the subject of the following chapter, *The Orb of the Ecliptic*.

In sum, Stephen of Pisa systematically uses the verb 'to imagine' and the adjective 'imaginary' in relation to the fundamental circles that define the celestial spheres. The presentation of these 'verisimilar' mental constructs in Chapters One and Two stands in sharp contrast to the then still prevalent Latin cosmographical tradition, which Stephen despised. In it the same circles tended to suggest almost physical realities, an inference Martianus Capella had been eager to avoid. In the Latin tradition, descriptions of the fundamental circles on the surface of the outermost sphere were often accompanied by a visual figure, and the reader would have expected to find one as well in Stephen's account of these circles. This is, however, not the case. A very general reference to a corresponding figure is found much later, at the end of chapter eight of Book II of the *Liber Mamonis*, *De ascendente et descensionibus*:

But all that we have said above about the imaginary circles on the surface of the great sphere is figured in the following illustration, in which we have drawn the circles and lines, so that it may be easier for the enquirer to imagine the above by considering that which is presented to his eyes.<sup>30</sup>

In the *De figura mundi* of the Madrid manuscript, the reference to a figure of the fundamental celestial circles also follows later:<sup>31</sup>

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- necessaria cognitione videamus. In rerum subsistentes natura nulli habentur in celo circuli de quibus hoc in libro dicturi sumus, sed imaginarii. Intellectus enim humani facultas mirabilis que non sunt imaginatione constituit quo ad eorum que sunt intelligentiam veri similibus paret viam. Ad indagandam igitur occultam subtilemque celestium sperarum positionem, ad cognoscendum solis aliarumque stellarum locum et magnitudinem in superficiebus celestium sperarum vetustiores circulos imaginati sunt quorum opera que perspicax animi vigor desiderabat agnovit. Eorum autem imaginatio in hunc fit modum'.
- 30 Ibn al-Haytham, *De figura mundi*, Stephen of Pisa transl., in *Liber Mamonis*, II, A.2.4 <ch. 8, *The Ascendent and the Descensions*>, § 184, lines 42–46 (Grupe, *The Latin Reception* 212): 'Quicquid autem de circulis imaginariis in superficie magne spere superius dictum est in subiecta descriptione figuramus, circulos et lineas in ea lineantes ut ex eorum que oculorum iudicio subdita est consideratione liceat inquirenti quecumque premissa sunt facilius imaginari'.
- 31 Id., *De figura mundi*, in Madrid, Biblioteca Nacional, MS 10059, ch. *De ascendente et descensionibus* (Vallicrosa J.M. Millás, *Las traducciones orientales* 297): 'Hec igitur est

Since we have finished our commentary on these imaginary circles in the surface of the highest orb, we will draw a diagram of this in which we will record all the circles and lines which we have mentioned, so that all that is in the surface of the orb may be represented to the reader, and this is the figure.<sup>32</sup>

As to the figure itself, it may already have been missing in the Arabic manuscripts available to the translators. In the Madrid manuscript, a space has been left for a figure that was never drawn. It is quite possible that either the author of the *Liber Mamonis* or the copyist of the extant manuscript had been searching for an illustration that roughly corresponded to the foregoing descriptions of celestial circles. Dirk Grupe has pointed out that the diagram of the Cambrai *Liber Mamonis* resembles Macrobius's figure of the correspondence between heavenly and earthly parallel circles and the oblique circle of the zodiac.<sup>33</sup> However, contrary to what is customary in the pre-twelfth and early-twelfth-century Latin cosmographical textual and pictorial traditions, including that of Macrobian manuscripts, there are not four or five, but nine parallel circles.<sup>34</sup>

In the Madrid version of *De figura mundi*, the schematic figure illustrating the principal celestial and terrestrial circles serves, in accordance with the Arabic and Latin cosmographical traditions, as an *a posteriori* summary of previous descriptions of the principal circles that structure both the outermost and the central terrestrial spheres. But in the version translated by Stephen of Pisa, the function assigned to this figure goes beyond summarizing and visualizing the passages about imaginary circles. Here, it is presented as offering a sensible starting point for a reverse, abstractive imaginative process. In other words, it depicts circles that are both *imaginarii* and *imaginabiles*. All in all, the main difference between descriptions of the circles that structure the spherical universe within the Latin cosmographical tradition and the twelfth-century account by Stephen of Pisa is that, in the latter, the discourse is more detailed and, above all, that the circles in question are considered imaginary geometrical

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dispositio ascensionum, et quia iam venimus ad declinandum hos circulos ymaginabiles in superficie orbis superioris, faciamus figuram in qua describamus omnes circulos et lineas quas diximus, et hoc est.

32 Id., *On the Configuration of the World*, ch. 8, *The Ascendant and the Ascension*, § 184 (Langermann transl. 119–120).

33 Cf. Macrobius, *Commentarii in Somnium Scipionis*, 11, 7, 4 (Armisen-Marchetti 209, fig. 2). In the *Liber Mamonis*, there are other figures of the *De figura mundi* that do not correspond precisely to the text they accompany. Grupe gives a detailed discussion of the problem of visual figures (Grupe, *The Latin Reception*, Introduction 66–70).

34 Cambrai, Médiathèque, MS 930, f. 26v.



objects. Stephen's pronounced interest in geometry led him to emphasise some of the epistemological particularities of this discipline, including the importance of imagination and imaginary constructs.

Finally, as pointed out by Dirk Grupe, Stephen of Pisa's treatise reflects something of the lively discussions going on in the scholarly circles of Antioch, which had allowed him to acquire his astronomical knowledge. Stephen thus opposes oral teaching to written transmission, pointing out that the latter does not allow the use of visual models which involve small sticks for representing the axes of moving spheres and circles. Instead, circles have to be imagined.<sup>35</sup>

### *Liber de orbe*

The second document of Arabic origin containing references to imagination again appears to reflect a teaching context where a three-dimensional model of the universe was used. This time, we find a relatively detailed description of an armillary sphere—literally, a sphere made of 'rings'—. This brief description was circulated in varying forms, thus attesting to a well established school-tradition, with teachers adapting it to specific needs. Some among them were interested in the role of imagination, while others limited themselves to describing the structuring elements of the sphere. In any event, with or without references to imagination, the text served primarily as an introduction to astronomy.

A first variant of this description of an armillary sphere can be found in a cosmography entitled *Liber Messehala de orbe tractatus* in the list of Gerard of Cremona's translations.<sup>36</sup> The precise date of the translation by Gerard, who died in 1187, remains uncertain. However, another version of *De orbe* circulated in the context of the Norman courts of Normandy and Sicily as early as the 1140s.<sup>37</sup> The version in twenty-seven chapters translated by Gerard of Cremona

35 Grupe, "Stephen of Pisa's Theory of the Oscillating Deferents of the Inner Planets", for the text, cf. Appendix [14] 399: 'Hoc [the movements of the annual sphere and of the deferent] in virgulis radiorum formam habentibus aperte poterit monstrari [...]. Verum quoniam occulta res est, circulorum quoque necessariam adhibeamus imaginationem'.

36 Burnett C. (ed.), "A Critical Edition of the *Vita*, *Commemoratio librorum* and *Eulogium* of Gerard of Cremona (Appendix 1)", in id., "The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century", *Science in Context* 14 (2001) 249–288; cf. 273–287.

37 Obrist, "William of Conches, Māshā'allāh, and Twelfth-Century Cosmology"; ead., "Guillaume de Conches. Cosmologie, physique du ciel et astronomie. Textes et images", in Obrist B. – Caiazzo I. (eds.), *Guillaume de Conches: philosophie et science au XII<sup>e</sup> siècle*,

was printed twice in the sixteenth century, while the second version, in forty chapters, remains in manuscript form.<sup>38</sup> As for the Arabic text, which is close to the long version, it survives in two manuscripts.<sup>39</sup> In the Latin *De orbe*, the description of an armillary sphere constitutes, respectively, Chapters Ten and Sixteen of the short and long versions. It is entitled *De circulis et lineis et punctis* and may originally have been part of a *Treatise on the Armillary Sphere* by a student of Isaac Israeli (d. c. 955), Dūnash ibn Tamīm, which too is only extant in manuscript form.<sup>40</sup>

In the long version of *De orbe*, Chapter Sixteen marks the transition between a series of chapters pertaining to natural philosophy and the astronomical section. This is not, however, the case in the short version, where Chapter Ten interrupts a series of expositions on the sun and the moon.<sup>41</sup> But in both versions the chapters describing those circles, lines, and points that structure the surface of the sphere are prefaced by a summary exposition on cognition:

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- Micrologus' Library, 42 (Florence: 2011) 123–196; ead., “Twelfth-Century Cosmography, the *De secretis philosophie*, and Māshā'allāh (attr. to), *Liber de orbe*”, *Traditio* 67 (2012) 235–276.
- 38 Messahalāh, *De scientia motus orbis* (Nuremberg, Ioannes Veissenburger: 1504); id., *De elementis et orbibus coelestibus, liber antiquus ac eruditus Messahalae laudatissimi inter Arabes Astrologi* (Nuremberg, Ioannes Montanus – Ulricus Neuberus: 1549). The 1504 edition is very faulty. For the manuscripts, cf. Obrist, “William of Conches, Māshā'allāh, and Twelfth-Century Cosmology” 64–66.
- 39 Mimura T., “The Arabic Original of (ps.) Māshā'allāh's *Liber de orbe*: its Date and Authorship”, *The British Journal for the History of Science* 48 (2015) 321–352.
- 40 Stern S.M., “A Treatise on the Armillary Sphere by Dunas ibn Tamīm”, in *Homenaje a Millás-Vallcrosa*, 2 vols. (Barcelona: 1954–1956) vol. 11, 373–382. Mimura attributes the entire *De orbe* to Dunash ibn Tamīm (“The Arabic Original”). However, it is a composite treatise. Among others, the cosmology of its initial theological section, which assumes eight celestial spheres, is not in agreement with the cosmology of its astronomical section, where we find ten celestial spheres. For David Pingree, there was no doubt that the astronomy of *De orbe* dates back to the late eighth century and should be credited to Māshā'allāh: Pingree D., “Māshā'allāh: Some Sasanian and Syriac Sources”, in Hourani G.F. (ed.), *Essays on Islamic Philosophy and Science* (Albany: 1975) 5–14; cf. 8; id., “The Greek Influence on Early Islamic Mathematical Astronomy”, *Journal of the American Oriental Society* 93 (1973) 32–43; id., “The Indian and Pseudo-Indian Passages in Greek and Latin Astronomical and Astrological Texts”, *Viator* 7 (1976) 141–195.
- 41 The chapter is preceded by chapter 8, *Sermo in scientia magnitudinis solis* and chapter 9, *Sermo in hoc quod luna mutuatur lumen a sole* (Messahalāh, *De elementis et orbibus coelestibus*). For the chapter series of either Latin version, cf. Obrist, “William of Conches, Māshā'allāh, and Twelfth-Century Cosmology” 69–80; for the chapter series of the Arabic version, cf. Mimura, “The Arabic Original of (ps.) Māshā'allāh's *Liber de orbe*” 5–11.

Know that he who understands (*intelligit*) those circles and chords and points in the intellect (*intellectu*) understands (*intelligit*) the quality of the orb. For through an understanding (*intellectu*) of those circles and chords and points, the form (*forma*) of the orb remains in the mind (*mente*). Therefore, upon being construed in the mind, it at once arrives at (*cadit in*) alchy.

CHAPTER TEN, SECTION 1

He who fully grasps (*percipiet*) the circles, lines and points doubtlessly comprehends (*comprehenderet*) the nature of the very firmament, for he will imagine (*imaginabit*) its form (*formam*) in his intellect (*intellectu*). For it is comprehended (*comprehenditur*) by reason (*ratione*) when imagined (*imaginatur*) in somebody's mind (*mente*).

CHAPTER SIXTEEN, SECTION 1

Next follows the list of the geometrical elements that structure the sphere on its outside, specifically three circles, three chords (lines), and seven points (ch. 10. 2 and ch. 16. 2). The short version of *De orbe* reads:

Therefore the first circle goes out from the east to mid-heaven, to the west, to the heaven below the terrestrial orb, to the east [...]. And of the three chords there is a chord which goes out from the east to the middle of the earth, to the west [...]. And points are the places where the circles are cut off, of the extremities of the three chords, and they are six. And the point of the earth, which is the middle of the world, is the seventh point [...]

CHAPTER TEN, SECTION 2

Both versions conclude the description of the structuring elements of the sphere with a phrase that repeats one of the introductory statements—namely, that an understanding of the geometrical structure of the sphere leads to an understanding of its 'quality' (short version), or 'nature' (long version):

He who understands (*intelligit*) the three circles and three cords and seven points also understands (*intelligit*) the quality of the orb.

CHAPTER TEN, SECTION 3

For he who fully grasps (*percipiet*) these, understands (*comprehenderet*) the nature of the very firmament.

CHAPTER SIXTEEN, SECTION 3

Chapter Sixteen of the long version of *De orbe* ends here, while Chapter Ten of the short one adds a fourth section, consisting of instructions for drawing the corresponding visual figure, and the figure itself.

Messahala, <i>De elementis et orbibus coelestibus</i> , Chapter Ten (Nuremberg: 1549) (short version)	Ps.-Māshā'allāh, [ <i>Liber de orbe</i> ], Chapter Sixteen (Florence, Bib. Naz. ms Conv. Soppr. J. I. 132, f. 7 vb–8ra) (long version)
<i>Ch. X. Sermo de circulis et cordis ac punctis</i>	<i>Ch. XVI. De circulis et lineis et punctis</i>
<p>1) Scias quod qui intelligit illos circulos et cordas et puncta intellectu, intelligit qualitatem orbis, quoniam intellectu horum circulorum et cordarum et punctorum stat forma orbis in mente. Cum ergo erigitur in mente, tunc iam cadit in alchy (alchi).</p> <p>2) Circulus ergo primus egreditur ex oriente ad medium celi, ad occidentem, ad inferius celum orbis terre, ad orientem [...]</p> <p>Et de tribus cordis est corda que egreditur ex oriente ad medium terre, ad occidentem [...]</p> <p>Et puncta sunt loca abscisionum circulorum, trium extremitatum cordarum, et sunt sex. Et punctum terre, quod est medium mundi, est septimum punctum [...]</p> <p>3) Hos ergo tres circulos et tres cordas et septem puncta, qui intelligit iam intelligit qualitatem orbis.</p> <p>4) Revolvam ergo circulum, et scribam in oriente A, et in meridie B, et in occidente G, et in septentrione D [...]</p>	<p>1) Qui perfecte circulos lineasque et puncta percipiet absque dubio naturam firmamenti ipsius comprehenderet. Formam namque eius in intellectu suo imaginabit. Ratione quippe comprehenditur cum in mente alicuius ymaginatur.</p> <p>2) Circulus quidem primus a puncto orientis ad punctum medii celi, et a puncto medii celi ad punctum occidentis, et inde ad punctum medii celi subterranei, unde iterum ad punctum orientis pertingit [...]</p> <p>Trium quidem linearum prima ab orientis puncto ad punctum centri terre, et ab illo ad punctum occidentis distenditur [...]</p> <p>Puncta vero septem sunt quorum sex ea loca sunt in quibus circulorum quisque alium dividit et linearum capita nempe sunt [...]. Septimus est punctus centri terre quod totius mundi centrum est [...]</p> <p>3) Quod qui perfecte ea percipiet, ipsius firmamenti naturam comprehendet.</p>

Messahala, *De elementis et orbibus  
coelestibus*, Chapter Ten  
(Nuremberg: 1549)  
(short version)

Ps.-Māshā'allāh, [*Liber de orbe*],  
Chapter Sixteen (Florence, Bib. Naz.  
MS Conv. Soppr. J. I. 132, f. 7 vb–8ra)  
(long version)

Et ponam ad illud figuram, ut videatur  
quod diximus sensibiliter. Et hec est  
forma eius.<sup>a</sup>

[Fig. 2.1]

- a The variant reading of *alchy* is based on Basel, Universitätsbibliothek, MS F II 33, f. 59v (s. XIV). For this manuscript, cf. Hughes B., *Medieval Latin Mathematical Writings in the University Library Basel*, typescript (Northridge, California State University: 1972) 17–26; cf. 19–20, n. 16. 2; for other manuscripts of the short version of *De orbe*, cf. Obrist, “William of Conches, Māshā’allāh, and Twelfth-Century Cosmology” 64–66. The figure here reproduced is from Messahalāh, *De elementis et orbibus coelestibus* (Nuremberg: 1549). The letters are missing in the 1549 edition.

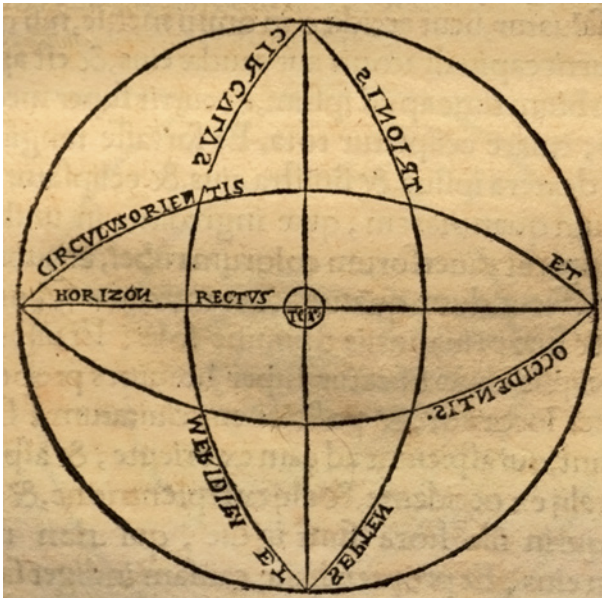


FIGURE 2.1 *Messahalah*, De elementis et orbibus coelestibus (Nuremberg, Ioannes Montanus – Ulricus Neuberus: 1549), woodcut.

For a close reading of the varying passages on cognition in Chapters Ten and Sixteen of *De orbe*, it will be useful to compare them to the Arabic original. Translated on the basis of the Berlin manuscript, the passage in question reads as follows:

Know—May God honour you—that he who fully understands (*fahima*) these circles, and points, and chords has an understanding of the organisation (*kayfiyya*) of the orb (*falak*). For the understanding (*fahmi*) of these circles, and points, and chords is a prerequisite for the constitution (*takwim*) of the image (*ṣūra*) of the orb in imagination (*dihn*). And if it is received (*waqa'a*) by imagination (*dihn*), it is conceived (*waqa'a*) by reason (*'aql*).<sup>42</sup>

Neither the Arabic nor its Latin adaptations refer in any direct way to a process of abstraction, and in all instances the mental geometrical construct seems to take precedence over the sensory perception of the system of circles, lines, and points. In the Arabic text the role of imagination is more prominent than in the long Latin version, and the short one does not mention imagination at all: once the structure of the sphere is understood, the faculty of imagination receives it as an image (*ṣūrat*), and from there it reaches reason. However, since the verb *waqa'a* signifies both 'to receive' and 'to conceive', and is being used not only in relation to imagination but also to reason, its semantic field is not easy to determine, not to mention that *dihn* also signifies intelligence. Unfortunately, the succinct Arabic description of the cognitive process makes it difficult to trace its precise doctrinal background and, thence, meaning.

Thus, aside from the brevity of the Arabic exposition, the translators had to struggle with the polysemy of the key Arabic terms relating to cognition. The translator of Chapter Ten of the short version, Gerard of Cremona, tends to respect the repetition of the relevant Arabic verbs and nouns. He uses the verb *intelligere* twice, the noun *intellectus* twice, and *mens* twice. In his translation of the verb *waqa'a*, he first writes that the form of the circles, chords, and points is 'constituted' (*erigitur*) in the mind; and then he gives a more literal translation of its multiple meanings—namely, 'to fall into,' 'arrive at' (*cadere*) *alchy*, which is a transliteration of *al-'aql*. The translator of the long

42 Berlin, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, MS Or. Oct. 273, f. 33v; the corresponding figure is on f. 34r. For the manuscript, cf. Ahlwardt W., *Verzeichniss der arabischen Handschriften der königlichen Bibliothek zu Berlin*, v (Berlin: 1893; reprint, Hildesheim – New York: 1980 141–143, n. 5654). I am grateful to my colleagues and friends for their help with the Arabic: Régis Morelon (CNRS/Univ. Paris 7, Paris) and Hala Annani.

version renders it as 'reason' (*ratio*). Thus, Gerard's translation seems to imply the following sequence of mental processes: first, one understands (*intelligit*) in the intellect (*intellectu*) those circles, lines, and points that constitute the sphere; as a consequence, one understands (*intelligit*) the 'quality of the orb'. Subsequently, through this understanding (*intellectu*), the form (*forma*) of the circles, chords, and lines can be conceived (*erigitur*) by the mind (*mente*). Finally, this form reaches (*cadit in*) reason.

The still unidentified translator of the long version pays greater attention to the shifting meanings of Arabic words within varying contexts: first, one has to 'fully grasp' (*qui perfecte [...] percipiet*) the circles, lines, and points; this then allows one to comprehend (*comprehenderet*) the 'nature of the firmament'. Furthermore, the form of the perceived object is imagined in the intellect (*intellectu*); understanding takes place in reason (*ratione*); imagination occurs in the mind (*mente*).

As previously mentioned, the last part of Chapter Ten of the short version includes instructions for drawing a visual figure, as well as the figure itself. Here one finds an additional and, for once, rather straightforward reference to imagination. It concerns a difficulty encountered in drawing a two-dimensional representation of the sphere. Since two of its lettered points (V and Z) cannot be represented in the visual figure, they have to be imagined:

I therefore turn the circle and write A in the east, B in the south, C in the west, and D in the north. I therefore say that it is the circle of the horizon. I therefore imagine V in mid-heaven, and Z in the middle of the heavens that are below the earth. For it is not possible to write it [the letter] within the figure, for the figure is a surface and that which is being spoken of is a sphere.<sup>43</sup>

Two further sentences specify that the figure is added as a concluding visual statement: 'And for this I put down a figure (*figuram*), so that what we said may be seen by the senses. And here is its form (*forma*).'<sup>44</sup> The Arabic text contains only the second concluding sentence, albeit in a more comprehensive form:

43 Messahala, *De elementis et orbibus coelestibus*, ch. 10, *Sermo de circulis et cordis ac punctis*: 'Revolvam ergo circulum, et scribam in oriente A, et in meridie B, et in occidente G, et in septentrione D. Dico ergo quod iste est circulus orizontis. Imaginabor ergo in medio celo V, et in medio celo eorum qui sunt sub terra Z. Quoniam non est possibile ut scribam eam in figura, quoniam figura est superficies, et narratum sphaera' (Nuremberg: 1549).

44 Ibid.: 'Et ponam ad illud figuram, ut videatur quod diximus sensibilibiter. Et hec est forma eius' (Nuremberg: 1549).

'Here is the image of that which has been exposed'. The same word that was previously used for the imagined form of the sphere with its circles, chords, and points now designates the material image, *ṣūra*.<sup>45</sup> As a matter of fact, the Arabic text uses the same very dense formula for announcing visual figures throughout. The Latin versions of *De orbe* vary these announcements, and the translator of the short one, Gerard of Cremona, frequently differentiates between *figura* and *forma*. The first connotes a material object, while the latter implies intelligibility.<sup>46</sup>

### *De recta imaginatione spere*

The second variant of the text describing the structure of the celestial sphere made of three circles, three lines, and seven points is part of the introductory section of a short cosmographical and astronomical treatise bearing the title *De imaginatione spere et circulorum eius* (*De recta imaginatione spere*). Its Latin manuscripts, which do not predate the thirteenth century, attribute it to Thābit ibn Qurra (ca. 824–901).<sup>47</sup> It usually appears together with three further texts that name Thābit ibn Qurra as an author: the *De motu octave sphere*, *De quantitibus stellarum*, and *De hiis que indigent expositione antequam legatur Almagesti*. All of these have been edited by Francis Carmody. However, *De imaginatione spere* is a compilation composed of overly shortened expositions and may well have been patched together in the Latin West.<sup>48</sup>

As indicated by its title, the *De imaginatione spere* attributes a fundamentally important role to imagination, and the very first sentence of the treatise presents truthful imagination as the basis for both the pursuit of astronomy and the general conception of the universe. Its introductory paragraph gives a cosmographical overview from a physical point of view, locating the imaginary observer at the central point of the spherical earth.

45 Berlin, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, MS Or. Oct. 273, f. 34r.

46 For instance, Messahala, *De elementis et orbibus coelestibus*, ch. 2, *Sermo in elementis quatuor, que sunt ignis, aer, aqua, terra, et in locis eorum, et qualiter creavit ea creator eorum*: 'Et hec superius posita figura est forma et dispositio illorum' [elements] (Nuremberg: 1549).

47 Carmody F.J. (ed.), *The Astronomical Works of Thabit b. Qurra* (Berkeley – Los Angeles: 1960) 118–119. For the manuscripts, see id., *Arabic Astronomical and Astrological Sciences in Latin Translation. A Critical Bibliography* (Berkeley – Los Angeles: 1956) 119–121. Carmody lists close to one hundred manuscripts. Morelon R. (ed. and transl.), *Thābit Ibn Qurra. Oeuvres d'astronomie* (Paris: 1987).

48 A *Book on the Use of the [Armillary] Sphere* is listed among Thābit's astronomical works; cf. Morelon, *Thābit Ibn Qurra. Oeuvres d'astronomie*, n. 26, xvi.



From there he imagines and conceives the outermost surface of the body of the universe. Then follows a variant of the first part of the text that forms Chapters Ten and Sixteen in *De orbe*: there are six points of reference on the uppermost surface of the world, while the seventh coincides with the center of the sphere. Imagination is thus solicited on all fronts, as it were—both in relation to the subject of imagination and to the imagined spherical world:

Beginning [our] astronomy in accordance with straightforward and truthful imagination, we understand the world to be a spherical, solid body. Its center is a point, which is in the middle of the earth and said to be the center of the earth. We also understand the earth to be like the center of the world, for it is in the middle, like an indivisible body in comparison to the size of the world. We also understand the world to be immobile and at rest. Therefore, we who reside, so to speak, in the center and not on the surface of the earth, understand to have posited on the uppermost surface of the world, all in all, a first oriental point, a second occidental, a third oriental [...], and a seventh of all of these [points] at the middle, i.e., the center of the world.<sup>49</sup>

The imaginary observer further has to imagine three chords between the six points, all of which are extended through the center. As for the three circles, the first one is the equinoctial circle, which stretches from the eastern point to the summit and to the western point and then returns to the eastern point after passing through the point 'underfoot'. The second is the meridian circle, and the third, the circle of the horizon.<sup>50</sup>

In *De imaginatione spere*, the description of the general structure of the outermost sphere that corresponds to Chapters Ten and Sixteen of *De orbe* merely constitutes the basis for a series of specifications and astronomical

49 Ps.-Thābit ibn Qurra, *De imaginatione spere*, § 1–2 (Carmody, *The Astronomical Works of Thabit b. Qurra* 140): 'Nos iuxta rectam imaginationem inchoantes astrologiam intelligamus mundum esse spericum corpus et solidum cuius centrum est punctus qui est in medio terre, et centrum terre dicitur. Intelligamus etiam terram esse quasi centrum mundi cum ipsa sit in medio et tamquam corpus indivisibile ad comparationem magnitudinis mundi. Intelligamus etiam mundum esse immobilem et quietum. Nos itaque tamquam in centro terre et non in eius superficie residentes, intelligamus in suprema superficie mundi totaliter accepti unum punctum orientalem, secundum occidentalem, tertium meridionalem, quartum septentrionalem, quintum in directo verticis, sextum in eius opposito sub pedibus, et septimum omnium eorum medium scilicet centrum mundi'.

50 Ibid., § 3–4 (Carmody, *The Astronomical Works of Thabit b. Qurra* 140).

developments, all of which are of a descriptive nature. The first of these gives a more detailed account of the structure of the universe, made in terms of axes, poles, and imaginary great circles, together with their intersections. All in all, 180 circles have to be imagined.<sup>51</sup> Then, the description of the 'circles of the height' (*circuli almucantharath*), which intersect with the 'circles of the horizon' at a right angle, merges with considerations on the astrolabe.<sup>52</sup> As for the zodiacal circle, it is said to extend through four imaginary points, from the east to the northern solstice, to the west, to the southern solstice, and back to the orient, and is thus divided into four quarters, and so on.<sup>53</sup>

The concluding paragraph of the *De imaginatione spere* repeats one last time, with reference to its initial sections, that the structuring elements of the outermost sphere are imaginary. Also, the axes, poles, equidistant great circles, and the zodiacal circle must be imagined from the very beginning—presumably of astronomical studies. Moreover, the world as a whole must be thought of as being presently formed by its Creator.<sup>54</sup>

While the reader of *De imaginatione spere* is left with no doubt that its anonymous author was fond of the idea of imagination, it is difficult to determine which text might have spurred his interest, or what precisely the rationale behind his references to imagination might have been. It would seem that the main source of inspiration was an astronomical compilation, rather than a theoretical exposition on mental faculties. As suggested by the use of an alternative expression to '*imaginemur*', namely '*sit*' ('suppose'; 'consider') and the concluding phrase of the relevant passage, the author may have had same acquaintance with geometrical demonstrations.<sup>55</sup> However, unlike the Arabic compiler of the currently known versions of *De orbe*, the author of *De*

51 Ibid., § 5–11 (Carmody, *The Astronomical Works of Thabit b. Qurra* 140–141).

52 Carmody notes that these passages follow an ancient and standard pattern (Carmody, *The Astronomical Works of Thabit b. Qurra* 118–119).

53 Ps.-Thābit ibn Qurra, *De imaginatione spere*, § 13–22 (Carmody, *The Astronomical Works of Thabit b. Qurra* 141–142).

54 Ibid., § 23–24 (Carmody, *The Astronomical Works of Thabit b. Qurra* 142–143): 'Nobis itaque tamquam in centro mundi residentibus colligitur ex predicta imaginatione in mundo totaliter intellecto et tamquam immobili et tamquam a Creatore nunc formato, tres esse principales cordas et tres circulos primordiales. Habemus quoque eorum axes et circulos equidistantes et suorum polorum magnos circulos, habemus etiam quartam zodiacum cum suis apendiciis non minus ceteris efficacem. Hee sunt que introducendis primo imaginanda occurrunt. Explicit Thebit de imaginatione spere'.

55 Ibid., § 3–6 (Carmody, *The Astronomical Works of Thabit b. Qurra* 140): 'Imaginemur etiam quandam cordam ab orientali puncto [...]. Sit etiam alter circulus per utrumque punctum meridiei [...]; sit tertius circulus per utrumque punctum meridiei [...]. Sic itaque manifestum est quod horum trium circulorum centrum est centrum mundi'.

*imaginatio sphaere* was not interested in relating the imaginary structure of the sphere to an actual diagram. Accordingly, manuscripts of this text neither include any reference to constructing a figure nor the figure itself.

*Investigantibus astronomie rationes and Investigantibus astronomiam*

The descriptions of the structuring geometrical elements of spheres and the corresponding references to imagination we have surveyed are all associated with general astronomical expositions. Further variants of these descriptions populate the introductions to two anonymous treatises that focus on planetary motions. In these, the respective enumerations of geometrical elements have been stripped of all references to imagination, thus testifying once again to the fact that we are dealing with a school text that was worked over again and again. Accompanied by a series of diagrams, the first of the two treatises, the *Liber de motibus planetarum*, was compiled in England in the third quarter of the twelfth century. It has the following *incipit*: '*Investigantibus astronomie rationes primo ponendum est [...]*'.<sup>56</sup> Its description of the structuring elements of spheres omits both instructions for drawing a corresponding visual figure of the sphere and the figure itself. Concerning the main text of *De motibus planetarum*, Philipp Nothaft notes that, within the Latin world, it represents an early instance of a 'physicalized astronomy'. It begins thus: '*Restat igitur de motibus planetarum tractare in sphaeris suis, et prius incipiendum a sole, qui in medio planetarum quasi rex in medio regni sui locatus principatum tenet [...]*'.<sup>57</sup>

The second treatise offers a slightly different *incipit* '*Investigantibus astronomiam primo sciendum occurrit [...]*' ('First of all students of astronomy have to know that there are seven immovable points, and three lines, and three immovable circles [...]'). This treatise dates to the final quarter of the twelfth century and focuses on rules for equating planets and eclipses.<sup>58</sup> As in the *Liber de*

56 *Liber de motibus planetarum*, Nothaft C.P.E. (ed.), "Ptolemaic Orbs in Twelfth-Century England. A Study and Edition of the Anonymous *Liber de motibus planetarum*", *Mediterranea. International Journal for Transfer of Knowledge* 3 (2018) 145–210, here: 183.

57 Ibid. (Nothaft, "Ptolemaic Orbs in Twelfth-Century England" 184).

58 *Investigantibus astronomiam*, Jn1, Pedersen F.S. (ed.), "A Twelfth-Century Planetary *Theorica* in the Manner of the London Tables", *Cahiers de l'Institut du Moyen Age grec et latin* 60 (1990) 199–318, here: 199: '*Investigantibus astronomiam primo sciendum occurrit VII esse puncta immobilia et III lineas et III circulos immobiles [...]*'. The text gives the times of solar eclipses for 1178, 1180, and 1181.

*motibus sperarum*, the description of the celestial coordinate system made of points, lines, and circles is part of the introduction to the main text. Although this introduction is considerably longer than in *De motibus planetarum*, it appears ultimately to depend on the same source. Again, in its initial section the compiler omitted instructions for drawing a visual figure of the sphere, yet chose to retain the visual figure itself, which is but the first of a series of diagrams.

The section of the cosmographical introduction that follows the description of the outermost sphere with its points, lines, and circles concerns the concentric inner spheres. Moreover, it divides the fundamental geometrical elements of the universe into the '*immobilia*' of the surface of the outermost sphere and the '*mobilia*' of the inner spheres: 'Through these *immobilia* are investigated the *mobilia*, which are the nine spheres and their parts'. These spheres and their parts are the seven planetary spheres, the eighth sphere of the fixed stars, and the ninth, all-encompassing sphere.<sup>59</sup>

The document with the *incipit Investigantibus astronomiam* is of interest not only for its varying the description of the sphere made in terms of points, lines, and circles, but also for its referring to a *sphera Ptolomei*. However, the reference does not occur in the immediate vicinity of the introductory section. It is mentioned in a chapter on establishing horoscopes, and specifically the degree of the ascendant, with the help of hours of equal length given in tables, and hours given on the astrolabe, of unequal length. Having explained the rule for the conversion of these hours, the compiler adds that 'Ptolemy's sphere' allows one to observe rising and setting arcs, and then discusses the astrolabe.<sup>60</sup> According to Fritz Pedersen's estimate, the *sphera Ptolomei* might have been an armillary sphere that also served as a basis for the exposition in paragraphs Jn1–3, which implies that the unknown compiler of *Investigantibus astronomiam* might have used an actual armillary sphere as a basis for his explanations.<sup>61</sup>

59 Ibid., Jn4 (Pedersen, "A Twelfth-Century Planetary *Theorica*" 224–25): 'Per hec immobilia considerantur ea que sunt mobilia, ut sunt ix sphere et illarum partes. Sunt namque vii sphere vii planetarum; octava stellarum fixarum, que quidem stelle fixe omnes equaliter distant a firmamento; nona est sphaera firmamenti, que omnes alias in se includit'.

60 Ibid., Jn68–69 (Pedersen, "A Twelfth-Century Planetary *Theorica*" 236): 'Ratio autem huius equationis earum [hours] est talis sicut in sphaera Ptolomei manifeste videtur. Circulus equinoctialis semper [...] equaliter movetur et equaliter oritur et occidit. Cum ergo totus in die naturali, id est in xxiiii horis directis, oriatur et ipse in ccclx gradus dividatur, in qualibet hora directa xv gradus illius circuli orientur; ergo, quotiens xv gradus illius circuli a principio diei sunt orti, tot hore directe sunt preterite. Auctores itaque astrolabii compositores invenerunt in astrolabio almeri, qui semper equaliter movetur in astrolabio [...]'.

61 Pedersen, "A Twelfth-Century Planetary *Theorica*" 221.

## Conclusion

Cosmographical expositions of Roman and Arabic origin, which became influential in the twelfth century, refer more or less directly to a three-dimensional representation of the spherical universe, the so-called armillary sphere. In astronomical chapters and treatises, references to imagination occur in this context. However, as is the case with Latin astronomical handbooks such as Hyginus's *Astronomy*, it is not easy to determine whether textual descriptions of the generally accepted cosmic structure rely on actual armillary spheres, on corresponding diagrams, or merely on the memory of one or the other type of representation. Accordingly, the process of imagination may be supposed to begin either with sense perception or with the description of a fictional sphere, and the corresponding visual figure may or may not be added. But in all cases the actual figure has, above all, an illustrative function. When the memory of geometrical demonstrations relating to the movements of stars and planets was revived in the twelfth century, some authors of cosmographical and astronomical texts also became interested in imaginary geometrical constructs and, more generally, in the function of imagination. Thus, the unknown compiler of *De imaginatione spere*, though he gives a purely descriptive account of the universe, went as far as to declare that imagination was the basis of all astronomical studies. Stephen of Pisa, who included numerous demonstrations in the astronomical sections that he added to his translation of Ibn al-Haytham's *On the Configuration of the World*, offered a short excursus on the imagination, which he must have considered a novel subject.

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# Minerva in the Forge of Vulcan: *Ingegno*, *Fatica*, and Imagination in Early Florentine Art Theory

David Zagoury

The early modern sense of the notion of *ingenium*, a term firmly rooted in Latin rhetoric and ubiquitous in the genres of biography and eulogy during the Renaissance, is particularly hard to capture.<sup>1</sup> Writing in 2007, the art historian Édouard Pommier discusses the translation of a passage from the *Decameron* in which Boccaccio calls Giotto and Forese da Rabatta ‘meravigliosi ingegni’.<sup>2</sup> ‘Boccaccio is precise’, remarks Pommier, yet ‘it would be too simple to translate [*ingegno*] as “genius”’. Pommier suggests ‘gifted with such talents of wit [*doté de tels talents d’esprit*]’ and, elsewhere, settles on ‘des intelligences supérieures’.<sup>3</sup> Several art historians before him likewise faced this challenge.<sup>4</sup> In addition to evoking personal nature, character, or innate qualities, *ingenium*

1 This research was first presented at the workshop *Ingenuity and Imagination in Early Modern Northern Art and Theory* at the University of Cambridge on 22 January 2016, and then in a revised form at the Annual Meeting of the Renaissance Society of America in Boston on 31 March 2016. I am especially grateful to Claudia Swan for her precious feedback throughout the process of turning this paper into an essay. I would also like to thank the other editors of this volume for their attentive reading, as well as Alexander Marr, José Ramón Marcaida, Richard Oosterhoff, and Raphaële Garrod for their comments and support.

2 Giovanni Boccaccio, *Decameron*, 6th day, 5th story.

3 Pommier É., *Comment l’art devient l’art dans l’Italie de la Renaissance* (Paris: 2007) 34.

4 In 1957 Erwin Panofsky translated *ingenium* as ‘mental gift’. See Panofsky E., *Renaissance and Renascences in Western Art* (London: 1970) 15. Michael Baxandall left *ingenium* untranslated in the English text in 1963. See Baxandall M., “A Dialogue on Art from the Court of Leonello d’Este: Angelo Decembrio’s *De Politia Litteraria Pars LXVIII*”, *Journal of the Warburg and Courtauld Institutes* 26, 3/4 (1963) 304–326, 320 and see n. 53. Martin Kemp in 1977 ‘followed the advice of Michael Baxandall’ to avoid the term ‘genius’, tentatively proposing ‘innate brilliance’ instead. See Kemp M., “From *Mimesis* to *Fantasia*: The Quattrocento Vocabulary of Creation, Inspiration and Genius in the Visual Arts”, *Viator* 8 (1977) 347–398, 351, n. 14. For further discussion, see Emison P.A., *Creating the “Divine” Artist: from Dante to Michelangelo* (Leiden – Boston: 2004) 321–348. For early modern attempts at translating *ingegno* into English see Marr A., “Pregnant Wit: *Ingegno* in Renaissance England”, *British Art Studies* 1 (2015) <https://doi.org/10.17658/issn.2058-5462/issue-01/amarr>. On early modern *ingenium* and genius, see also Gensini S. – Martone A. (eds.), *Ingenium propria hominis natura* (Naples:

also conveyed the idea of a certain modality of cognition. Its semantic field encompassed invention, problem-solving, imagination, perception, and discourse. The etymological trajectory linking our current, laudatory term *genius* with the much more descriptive, early modern *ingenium* has yet to be traced. Among other things, its reconstruction is essential to our understanding of how mental abilities were conceptualised and valued during the Renaissance.

This essay contributes to our understanding of the cognitive ability subsumed under *ingenium* by reconstructing the role of the Italian notion of *ingegno* in mid-Cinquecento Florentine artistic practice and theory. At the time of the first critical appraisals of Michelangelo—the archetypal ‘genius’ for many centuries to come—the intellectual milieu which most fostered his fame, the circles of the Accademia Fiorentina (founded in 1540) and the Accademia del Disegno (founded in 1563), offered ample evidence for the uses and traction of the term. Indeed, *ingegno* was caught up in a number of theoretical discussions coinciding with what may qualify as the birth of art theory in the writings of Benedetto Varchi (1503–1565), a philosopher with a profound interest in the visual arts. Artists, as we shall see, were also involved, and even proposed allegorical personifications of *ingegno*. Our starting point is a micro-historical analysis of events that took place in the spring of 1547 when, over the course of a matter of weeks, crucial debates took place in Florence. In this context, *ingegno* was played off against *fatica* (labour, toil), a notion that also played an important role in academic culture. The traditional hierarchy of mental faculties, in which *ingegno* had pride of place, came to be reconsidered as Varchi suggestively assimilated *ingegno* with imagination. Simultaneously, practising artists vindicated the manual component of their work by extolling the values of *fatica*. The second half of this essay posits that these theoretical debates found expression in a small painting on copper by Giorgio Vasari (1511–1574): *The Forge of Vulcan* (Uffizi). Looming over the episodes invoked here is the ghost of Michelangelo Buonarroti (1475–1564), not yet called a *genio*—but already ‘angel divine’.

### *Ingegno and Fatica*

Our enquiry begins with a little noted passage in a lecture on the arts by Benedetto Varchi delivered on 13 March 1547 before the Accademia Fiorentina

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2002); Brann N.L., *The Debate over the Origin of Genius during the Italian Renaissance* (Leiden: 2002); and the classic study Zilsel E., *Die Entstehung des Geniebegriffes* (Tübingen: 1926).

in the church of Santa Maria Novella.<sup>5</sup> Varchi offers what is perhaps the most significant discussion of *ingegno* in mid-Cinquecento art theory, by pitting this term against the notion of *fatica*—toil, labour, or, in the words of the *Vocabolario della Crusca*, the ‘breathlessness and pain endured in the act of working’.<sup>6</sup>

All arts could tentatively be divided on the whole in the following way: in some arts one seeks and values more the *ingegno* than the *fatica*, and in others, on the contrary, one values and seeks more *fatica* than *ingegno*; furthermore, in some *ingegno* and *fatica* are on a par, while in others one needs nothing but *fatica*.<sup>7</sup>

5 This lecture was published along with the one delivered on 6 March 1547 (discussed later on) in: Varchi Benedetto, *Due lezioni* (Florence, Lorenzo Torrentino: 1550) 56–155. (For all citations of the *princeps* I retain the title *verbatim*, but use the modernised ‘lezioni’ everywhere else). It was published in Barocchi P. (ed.), *Trattati d'arte del Cinquecento fra Manierismo e Controriforma* (Bari: 1960) vol. 1, 1–82, and in *facsimile* with German translation in Varchi Benedetto, *Paragone – Rangstreit der Künste: Italienisch und Deutsch*, eds. O. Bätschmann – T. Weddigen (Darmstadt: 2013). On these lectures, see also: Mendelsohn L., *Paragoni: Benedetto Varchi's Due lezioni and Cinquecento Art Theory* (Ann Arbor: 1982); Bodart D. – Hendlar S., “Il primo sondaggio della storia dell'arte: Benedetto Varchi e il paragone fra pittura e scultura”, in Luzzatto S. – Pedullà G. (eds.), *Atlante della letteratura italiana* (Turin: 2010) 103–110; Varchi, *Paragone* 6–70. For a more complete review of bibliography on Varchi, see Jonietz F., “Varchi im Settecento: die Bibliotheca Bartolommei, Florentiner Zensurmaßnahmen und eine wiederentdeckte Textfassung der beiden ersten Lezioni an der Accademia Fiorentina (1543)”, *Wolfenbütteler Renaissance-Mitteilungen* 35 (2014) 21–39, 22–24.

6 *Vocabolario degli Accademici della Crusca* (Venice, Giovanni Alberti: 1612) 334: ‘Affanno, e pena, che si sente, e si patisce nell'operare. Latino: labor’. The first work in Italian specifically dedicated to *ingegno* would appear some thirty years later, in 1576. See Persio A., *Trattato dell'ingegno dell'huomo*, ed. L. Artese (Pisa – Rome: 1999). On *ingegno* in the visual arts see the references in n. 4 above, as well as Kemp M., *Behind the Picture: Art and Evidence in the Italian Renaissance* (New Haven, Conn. – London: 1997) 226–255 and *passim*; Feser S., “Talent”, in Burioni M. – Feser S. – Lorini V. (eds.), *Kunstgeschichte und Kunsttheorie: eine Einführung in die Lebensbeschreibungen berühmter Künstler anhand der Proemien* (Berlin: 2010) 293–295; Kemp M., “The ‘Super-Artist’ as Genius: The Sixteenth-Century View”, in Murray P. (ed.), *Genius: The History of an Idea* (Oxford: 1989) 32–53; Pfisterer U., “Ingenium und Invention bei Filarete”, in Klein B. – von dem Knesebeck H.W. (eds.), *Nobilis arte manus. Festschrift zum 70. Geburtstag von Antje Middeldorf Kosegarten* (Dresden: 2002) 265–289; Summers D., *The Judgment of Sense: Renaissance Naturalism and the Rise of Aesthetics* (Cambridge – New York: 1987) 99–101.

7 ‘Le quali tutte [arti] potremmo, per avventura, dividere generalmente in questo modo, che alcune sono nelle quali si ricerca e vale più lo ingegno che la fatica, et in alcune, all'incontro, vale e si ricerca più la fatica che l'ingegno; in alcune ancora sono pari l'ingegno e la fatica, et in alcune non fa di bisogno se non la fatica sola’. Varchi, *Due lezioni* 71–72; also in

In laboured scholastic style, Varchi goes on to explain that his distinction can be refined, mentioning various alternatives and specifying that the ratio between *ingegno* and *fatica* may vary, as can the absolute quantities of each. Artistic practice is subsumed, therefore, under a spectrum of typologies of work. The relationship between *ingegno* and *fatica* recalls the traditional pairing of *ingenium* and *ars* in classical rhetoric, frequently cited by the Italian humanists.<sup>8</sup> The traditional idea behind this coupling was that the arts always require inborn talent (*ingenium*, *natura*) as well as acquired skill (*ars*)—and, according to Horace, a ‘friendly’ alliance of both.<sup>9</sup> Varchi’s binary, however, functions differently. According to his view, *ingegno* and *fatica* may coexist, but remain independent of and antithetical to one another as aspects of artistic work.

Varchi’s dichotomous framing of *ingegno* invites us to elucidate this concept through its opposite. We may begin by enquiring briefly into the significance of *fatica*, thereby fleshing out the meaning of its counterpart, *ingegno*, through a form of *definitio ex negativo*. Indeed, unlike the traditional complements to *ingenium* (*ars*, *industria*, *doctrina*) the notion of *fatica* bore specific associations in the Accademia Fiorentina, under the aegis of which Varchi was operating.<sup>10</sup> The very fact that Varchi chose this term as *ingegno*’s rhetorical opposite deserves special attention. The relevance of *fatica* is clear, for

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Barocchi, *Trattati* vol. 1, 18. It should be noted that at this stage of his lecture Varchi is still discussing *arte* in its broader acception, as including for example medicine or agriculture as well as the fine arts. The *fatica* and *ingegno* distinction is not categorical, as elsewhere Varchi speaks of ‘fatica d’ingegno’, Bronzino of ‘fatica dell’animo’ (Varchi, *Due lezioni* 94 and 103 respectively), and in Anton Francesco Doni we read that bronze sculpture is ‘piu faticosa, d’ingegno, d’arte, et di mano’. See Doni Anton Francesco, *Disegno del Doni* (Venice, Gabriel Giolito di Ferrari: 1549) 18v. This nuance should be compared to the distinction made by Leonardo between *fatica di corpo* and *fatica di mente*. See Mendelsohn, *Paragoni* 54.

- 8 Michael Baxandall has shown that the pair *ars et ingenium* was already applied to visual artists by Angelo Decembrio in the mid-fifteenth century. See Baxandall M., *Giotto and the Orators: Humanist Observers of Painting in Italy and the Discovery of Pictorial Composition, 1350–1450* (Oxford: 1971) 16 and Baxandall, “A Dialogue” 320. *Ingenium* was also paired with *industria*, *labor*, *manus*, *studium*, and *doctrina*. Varchi’s division also certainly owes to Galen’s distinction between the intellectual (liberal) arts and the manual arts, which Varchi quotes earlier. However his *ingegno/fatica* distinction applies to the manual arts, as it follows Varchi’s statement that ‘all arts are mechanical [...] namely manual’.
- 9 Horace, *Ars poetica*, 408–411. Other relevant passages on this duality include: Cicero, *De oratore*, I, 113–114; *Rhetorica ad Herennium*, III, 29.
- 10 On artistic *labor* in the Italian sixteenth century, see Jonietz F., “Labor omnia vincit? Fragmente einer kunsttheoretischen Kategorie”, in Bleuler A.K. et al. (eds.), *Aemulatio: Kulturen des Wettstreits in Text und Bild (1450–1620)* (Berlin – Boston: 2011) 572–681, and its bibliography. I am grateful to Anna Magnago Lampugnani for sending me this reference.

example, from the debates on the *questione della lingua* which dominated the Accademia Fiorentina at mid-century. In a lecture published in 1547, the same year in which Varchi delivered the lecture we have been discussing, Giovan Battista Gelli (1498–1563) extolled the superiority of Tuscan by relying on the notion of *fatica*:

The more an operation is peculiar to man, and according to his nature, the easier it is for him, and less laborious [*faticosa*] [...]. Our language [Tuscan] is less laborious [*men faticoso*] and easier than any other; therefore it is more appropriate and more in accord with [man's] nature. To see that this is true, think only that no other language is easier to learn than ours. Take somebody who does not know another language than his own and take him to Turkey, to Germany, among Spaniards, French or Slavic people, or among any other people you want; and then take him to us. You will see—and this is shown by experience—that he will not learn as much of any other language in a year as he will of ours in a month.<sup>11</sup>

Gelli does not refer explicitly to the *ingegno* or 'genius' of his language—in spite of this trope occurring already in Dante<sup>12</sup>—but his opposition between the laborious languages, which cause *fatica*, and the intuitive ones clearly places

11 'Tanto quanto una operazione e all'huomo piu propria, & secondo la sua natura tanto gl'è anche piu facile & men faticosa [...]. Il parlare nostro gl'è men faticoso, & piu facile che alcun'altro; addunque gl'è piu proprio & piu secondo la natura sua. E che questo sia il vero, ponete mente, che nessuna lingua è piu facile a imparare, che la nostra. Pigliate uno che non sappia altra lingua che la sua, & menatelo in Turchia, nella Magna, fra Spagnoli, Francesi o Schiavoni, o tra quale altra gente si voglia; e poi lo menate tra noi; voi vedrete (& questo ne mostra la esperienza) ch'ei non imparerà di qual si voglia lingua tanto in uno anno, quanto ei farà della nostra in un mese'. Giovan Battista Gelli, in *Lettioni d'academici fiorentini sopra Dante* (Florence, Doni: 1547) 35–36. The lecture, originally delivered in 1541, was included in Doni's volume without the lecturer's permission, and later republished with Gelli's *imprimatur* as *La prima lettione di Giovanbatista Gelli fatta da lui l'anno 1541, sopra un luogo di Dante nel XXVI capitol del Paradiso* (Florence, Torrentino: 1549). Promoting Tuscan was one of the main goals of the Accademia Fiorentina, and Gelli's argument is by no means the most daring to have been put forth in the *questione della lingua* debate. Pierfrancesco Giambullari claimed in his *Gello* (1546) that Tuscan derived from Aramaic through Etruscan, and not from Latin (thereby outclassing Rome), and later cited a document by Athenaeus of Naucratis found in the Biblioteca Laurenziana as evidence of Noah's coming to Tuscany.

12 'Et primo de siciliano examinemus ingenium [And first let us examine the genius of the Sicilian dialect]'. Alighieri Dante, *De vulgari eloquentia*, 1, 12, 2, cited from id., *Dante's Treatise De vulgari eloquentia*, ed. A.G.F. Howell (London: 1890) 27.

Tuscan on the side of ingenuity. In considering what is ‘peculiar to man, and according to his nature’, he alludes to the very etymology of *ingenium* as *ingenium*, that which is inborn, ‘genetic’ or, as expressed for instance in the *Vocabularium* of the medieval lexicographer Papias, ‘quasi intus genitum vel genium, idest naturale [almost within one’s generation or inclination, namely natural]’.<sup>13</sup>

The Florentine academicians’ ambivalent relation to *fatica* is also expressed in the *impresa* (emblem) chosen to adorn the frontispiece of their first publication. Above a jumble of books supporting an oil lamp, the emblem displays a scroll bearing the motto *KAMATOS EYKAMATOS* [Fig. 3.1].<sup>14</sup> A passage by Lodovico Domenichi (1515–1564) in Paolo Giovio’s (1483–1552) *Dialogo dell’imprese* explains that ‘in our language the motto would sound something like *fatica senza fatica* (labour that does not tire), because although the study of letters is very laborious, the delight that one derives from it is so great that it does not cause *fatica* to the eager student’.<sup>15</sup> The academic ideal of *otium litteratum* is expressed as the transcendence of traditional labour.<sup>16</sup>

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- 13 Papias, *Elementarium doctrinae rudimentum* (Venice, Philippus Pincius: 1496) 79v. On the rhetoric of *ingenium* as innate talent in sixteenth-century Italian art, see Keuper U., “Wie der Vater, so der Sohn? Luca Cambiasos, Selbstbildnis mit Porträt seines Vater”, *Marburger Jahrbuch für Kunstwissenschaft* 40 (2013) 129–148, esp. 140–142.
  - 14 The Accademia Fiorentina previously had an *impresa* devoid of motto depicting three poets (supposedly Dante, Petrarch, Boccaccio) and a river (supposedly the Arno). See Ciardi R.P., “A Knot of Words and Things’: Some Clues for Interpreting the Imprese of Academies and Academicians”, in Chambers D. – Quiviger F. (eds.), *Italian Academies of the Sixteenth Century* (London: 1995) 37–60. Some academic lectures had been published separately with other presses without the Accademia’s official stamp, such as Varchi’s *Lettura sopra il sonetto della gelosia di Monsignor della Casa* (Mantua, Federico Sansovino: 1545). On the editions of the Accademia’s lectures, see De Gaëtano A., “The Florentine Academy and the Advancement of Learning through the Vernacular: the Orti Oricellari and the Sacra Accademia”, *Bibliothèque d’Humanisme et Renaissance* 30, 1 (1968) 19–52, and Andreoni A., “Questioni e indagini per l’edizione delle Lezioni accademiche”, in Bramanti V. (ed.), *Benedetto Varchi, 1503–1565* (Rome: 2007) 1–24.
  - 15 Giovio Paolo, *Dialogo dell’imprese militari et amorose* (Lyon, Guglielmo Rouillio: 1574) 249: ‘Il qual motto suona in nostra lingua, come sarebbe à dire, fatica senza fatica. Perche, anchorche lo studio delle lettere sia molto laborioso, è però tanto il diletto, che se ne trahe, che ciò non par fatica à chi lo fa volentieri’. Domenichi also says the *impresa* was originally designed by Francesco Campana on behalf of the Medici library at San Lorenzo.
  - 16 On *otium litteratum* and its relevance for the Italian academies, see Fumaroli M., “Academia, Arcadia, Parnassus: trois lieux allégoriques de l’éloge du loisir lettré”, in Chambers D. – Quiviger F. (eds.), *Italian Academies of the Sixteenth Century* (London: 1995) 15–36. On this strategy in the rhetoric of Benvenuto Cellini, see Tylus J., *Writing and*



FIGURE 3.1 *Francesco Campana, engraved frontispiece to the Lettioni d'academici fiorentini sopra Dante (Florence, Doni: 1549).*

*Fatica*, then, did not only refer to the bodily consequences of physical exertion—the ‘breathlessness and pain’ described in the *Vocabolario della Crusca*’s definition cited earlier. Its connotations, rather, were dual: in addition to that which is corporeally exerting, *fatica* could also signal the intellectually challenging. In the discussion to follow, we shall reconstruct the view of Florentine artists on *ingegno* along two corresponding axes: difficulty and corporeality. Their perspectives on the matter will emerge from the relationship of *ingegno* to each of these notions. In relation to difficulty, we shall see how artists took the view that an ingenious creator is one who constantly wrestles with difficulty, developing a veritable culture of *difficoltà*. In relation to corporality, we shall see how the physicality involved in the making of art and its mimetic aims prevented artists from laying claim to *ingegno*, and how Varchi’s doctrine of artistic creativity effected a shift.

### *Difficoltà: A Touchstone of Ingenuity*

The academic culture of ingenuity outlined so far provides the backdrop against which Florentine architects, sculptors and painters were prompted to stake claims for the nobility of their arts. Most aspired to the status of academician—and indeed Agnolo Bronzino (1503–1572), Il Tribolo (Niccolò de’ Pericoli, 1500–1550), Michelangelo and Benvenuto Cellini (1500–1571) were all early members of the Accademia Fiorentina, yet only as poets.<sup>17</sup> Their appraisal of *ingegno* and *fatica*, however, stood in stark contrast to that of the academicians. A record of their views survives in an opinion poll Varchi ran in 1547. In preparation for his 13 March lecture on the arts Varchi famously canvassed his most eminent artist friends (including Michelangelo, Bronzino, Jacopo da Pontormo, Tribolo, Cellini, and Giorgio Vasari) on the *paragone* debate—that is, the question of which of the figurative arts (painting or sculpture) should be regarded as the noblest.<sup>18</sup> The results of what has been called the ‘first poll in

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*Vulnerability in the late Renaissance* (Stanford, Calif.: 1993) 44–53, and Turello D., “How Much Does it Cost to be Stylish? Ease, Effort, and Energy Consumption in Benvenuto Cellini’s *Vita*”, *Renaissance Studies* 29, 2 (2015) 280–293.

17 Other artist members include Francesco da Sangallo and Baccio Bandinelli. See Mendelsohn, *Paragoni* 25–26; Heikamp D., “Rapporti fra accademici ed artisti nella Firenze del ‘500”, *Il Vasari* 15 (1957) 139–163; Quiviger F., “The Presence of Artists in Literary Academies”, in Chambers D. – Quiviger F. (eds.), *Italian Academies of the Sixteenth Century* (London: 1995) 104–112.

18 The lecture is the second of the *Due lezioni*. See n. 5 above. The term *paragone* was not used by Varchi; it gained art-critical currency after Guglielmo Manzi’s 1817 edition of Leonardo’s *Trattato della pittura*.



the history of art' show that artists appraised *fatica* in a manner radically different from the *letterati*—and that difficulty was an apple of discord.<sup>19</sup> Vasari's reply to Varchi is, as is to be expected, the most articulate:

I say this: all things which are easy to the *ingegno* are less artful. And to show you the excellence of both [painting and sculpture] and let you judge for yourself, you can, if you wish, do this: take a ball of earth and form a face, an animal or any other thing by hand, without concern for colour, light, or shadow; and once this is done, take a sheet of paper and draw the same thing on it, and once you have outlined it, try to shade it in with your stylus, pen, pencil or paintbrush. And with this you will make your work such that you will judge the facility and quality of one and the other; and that which will be easier to realize you should find less perfect.<sup>20</sup>

Grounding his argument in a practical experiment, Vasari's line of reasoning perfectly mirrors Gelli's on second language acquisition—only to reach a diametrically opposed conclusion. While for the latter facility implied greater ingenuity, for the former the noblest pursuit was, by definition, the most difficult.

Vasari's cult of *difficoltà* epitomises the strategic response of artists to the *otium litteratum* of the academicians. It implies a remarkable valuation of *fatica*: Michelangelo, Vasari wrote, 'had a real propensity for the labours [*fatiche*] of art, given that he succeeded in everything, no matter how difficult it was, for he had received from Nature a very fit *ingegno* that was well adapted

19 Bodart – Hendler, "Il primo sondaggio", 103. Erwin Panofsky went further, calling it 'perhaps the first public opinion poll'. Panofsky E., *Galileo as a Critic of the Arts* (The Hague: 1954) 3. On this episode, see also Rossi S., *Dalle botteghe alle accademie: realtà sociale e teorie artistiche a Firenze dal XIV al XVI secolo* (Milano: 1980) 89–122.

20 'Dico questo: che tutte le cose che facile all'ingegno si rendano, quelle meno artificiose si giudicano essere; e per voler mostrarvi la eccellenza di tutte due, e voi di esse giudice, potrete, piacendovi, far così: pigliate una palla di terra e formate un viso, uno animale di man vostra o d'altro incerto, nella quale, mentre che ciò farete, non arete a cercare né del colore, né de' lumi o dell'ombre; e finito questo, pigliate una carta e disegniatevi su il medesimo, e quando dintornato avete le prime linee, voi con lo stile, o penna o matita o pennello, cominciate a ombrarla. E [con] questo vi si renderanno nell'opera vostra tali, che voi giudicarete la facilità e bontà dell'una e dell'altra; e quella che vi sarà più facile a esercitarla troverete manco perfetta'. Vasari in Varchi, *Due lezioni* 122. The zeal with which Vasari formulated his response, dated 12 February 1547, is easy to understand. Aged 36 at the time, this is Vasari's first officially published piece of writing.

to his exceptional talents in the art of design'.<sup>21</sup> The artist's *ingegno* is praised as the capacity that draws him toward the challenges of ever more difficult work, while *fatica* is a value and a point of pride, linked to the idea that 'greater efforts [*fatiche*] and dangers are reasons for greater nobility'.<sup>22</sup> Sculptors bully painters accordingly by calling their trade 'a women's profession [*mestiere delle donne*]' because it requires less *fatica*.<sup>23</sup> This line of reasoning gave rise to an altogether different form of *fatica senza fatica*. An ingenious work was one that generated a second type of illusion beyond pictorial *mimesis*: the illusion of effortlessness.<sup>24</sup> Indeed, for Vasari Michelangelo 'surpassed and triumphed over the ancients, for in his works he knew how to wrest things out of difficulty [*difficoltà*] with such ease, that they appear to be executed without effort [*fatica*], although whoever later tries to sketch his works will expend much effort in imitating them'.<sup>25</sup> What Alfred Gell called 'the halo effect of technical difficulty' is implicit in this aesthetic axiology.<sup>26</sup> It should come as no surprise, then, that artists rebuked academicians such as Varchi and Gelli for their tendency to overlook the physical and material demands of artistic practice. This is perfectly captured by an anecdote about Michelangelo himself. It is said that, upon encountering the master, Varchi complimented him thus: 'Signor Buonarroti, you have the brain of a Jove!' To which Michelangelo replied: '[...] but Vulcan's hammer is required to make something come out of it'.<sup>27</sup>

21 Vasari Giorgio, *The Lives of the Artists*, trans. Bondanella J.C. – Bondanella P.E. (Oxford: 1991) 471, with 'mind' for *ingegno*. For the Italian original see Vasari Giorgio, *La Vita di Michelangelo nelle redazioni del 1550 e del 1568*, ed. Barocchi P. (Milan: 1962) vol. 1, 116; Vasari Giorgio, *Le vite de' più eccellenti pittori, scultori e architettori, nelle redazioni del 1550 e 1568*, eds. R. Bettarini – P. Barocchi (Florence: 1966) vol. 6, 108.

22 Vasari, *Le vite* vol. 1, 19.

23 Varchi, *Due lezioni* 108: 'E quando fusse più difficile la pittura, direbbero gli scultori, i quali la tengono mestiere da donne a comperazione della scultura, che questa ragione fa per loro, perché bisogna più fatica a voler dare ad intendere la bugia [...]'.  
 24 This recalls Baldassare Castiglione's notion of *sprezzatura* as the talent of concealing *arte* ('vera arte che non par esser arte'). What seems done '*senza fatica*' has *grazia*, and what is forced causes *disgrazia*. See Castiglione Baldassare, *Libro del cortegiano* (Venice, Figliuoli di Aldo: 1547) 19v.

25 Vasari, *The Lives* 471 (amended); Vasari, *Le vite* vol. 6, 108.

26 See Gell A., "The Technology of Enchantment and the Enchantment of Technology", in Hirsch E. (ed.), *The Art of Anthropology: Essays and Diagrams* (Oxford: 2006) 159–186, 166. This essay was first published in 1992.

27 Clements R.J., *Michelangelo's Theory of Art* (London: 1963) 35.

In other words, to praise of his *ingegno* the artist felt compelled to retort that *fatica* was required in equal measure.<sup>28</sup>

Varchi's attitude toward labour can in part be traced to the scholastic training he received at Padua and Bologna. A pupil and friend of Lodovico Boccadiferro at Bologna, he adhered to Aristotelian faculty psychology and its insistence on a hierarchy among the 'internal senses'.<sup>29</sup> In particular, Varchi embraced a theory drawn from Themistius's paraphrase of *De anima*, according to which life is structured like an ascending chain of matter (thing in potency) and form (thing in act), the two constantly intertwined.<sup>30</sup> At the bottom of the chain is inanimate matter, which is less perfect, and at its top, the 'agent intellect'. Inanimate matter in act is the vegetative soul; the vegetative soul in act is the sensitive soul; the sensitive soul in act is the imagination; and so on up to the agent intellect. This hylomorphic version of the *scala naturae* ends not with the highest being (God), but with the highest (and least material) intellectual power. The model of an ascending pyramid from the more material to the more immaterial colours Varchi's thinking about the arts and even his

28 A similar dialectic can be found in the artists' replies to Varchi's 1547 poll. Bronzino, for example, after praising Varchi's *raro ingegno*, emphasizes that he 'perhaps won't be able to express entirely with words or ink the pains [*fatiche*] endured by an artist in his work' (Varchi, *Due lezioni* 132). Concurrently, we can in fact discern two moments in Varchi's attitude to *fatica*. The first section of his lecture (*Prima disupta*) was clearly composed before the poll. In it, Varchi is still an unsparing intellectualist, and calls the manual arts 'vile and disgraceful, [...] practiced with bodily strength and pain [*forze e fatiche del corpo*], which the Greeks, because one works with the hands, call *chirurgicas*', opposing them to the 'liberal and honest' *trivium* and *quadrivium* (Varchi, *Due lezioni* 70). The *Seconda disputa* of his lecture was rewritten after Varchi had received the artists' opinions (except for Michelangelo's, which only reached Varchi early in 1550, see Bodart – Hendler, "Il primo sondaggio", 104–106). In it, his views on the bodily aspect of the manual arts are considerably toned down. At times, he virtually suspends his intellectualist views in order to take into account the arguments imparted to him by the artists, such as claims that greater *fatica* implies greater nobility due to *difficoltà*.

29 Varchi knew this theory through the works of Marcantonio Zimara. Varchi's manuscripts on psychology have come down to us and were recently reexamined by Marco Sgarbi. See Sgarbi M., "Benedetto Varchi on the Soul: Vernacular Aristotelianism between Reason and Faith", *Journal of the History of Ideas* 76, 1 (2015) 1–23.

30 Sgarbi, "Varchi on the Soul" 3. On Varchi's knowledge of Zimara's *Theoremata*, note that in the *Due lezioni* he pays homage to 'the great Philosopher M. Marcantonio Zimara in his most erudite *Teoremi*, to which all scholars owe much for good Philosophy, since he was among the firsts who, having rid himself of the excessive subtleties and sophistries of the Latins, followed the Greek Authors, and promoted truth in all other respects' (Varchi, *Due lezioni* 34).

lectures on Dante.<sup>31</sup> Yet such a system, by making the immaterial paramount, necessarily disregards the material aspect of artistic creation. Varchi's theory of art requires, in that sense, an effort of integration. As we shall see, it is through his theory of artistic imagination that he effected such an integration.

### Corporality and Imagination

The tendency of the Florentine academicians to overlook the physical demands of artistic practice is probably linked to the role they ascribed to *ingegno*. Just as *fatica* bore connotations of physicality, *ingegno* evoked the immaterial and the purely intellectual. This was also reflected in the objects traditionally ascribed to *ingegno* understood as mental power. According to the classical tradition, *ingenium* was not an empirical faculty. It had no purchase on the sensible world, and mostly concerned immaterial objects of thought. As Cicero, who was often quoted in the Accademia Fiorentina, explains, 'a great *ingenium* is able to abstract the mind from the senses and separate thought from the force of habit'.<sup>32</sup> Moreover, for the scholastics, whose thought still dominated Italian universities, *ingenium* was 'the extension of the intellect given to the cognition of the unknown [*cognitio incognitorum*]'; it was the source of logic, and opposed to *experientia*.<sup>33</sup> According to its traditional theoretical makeup, *ingegno* was conceived of as the capacity to manipulate abstract entities, and was active in acts of language and thought. Broadly speaking, however, it was

31 Indeed, Varchi's mid-March lecture begins with a review of the hierarchical structure of the soul (particular reason, universal reason, and within the latter practical intellect, speculative intellect, etc.). See Varchi, *Due lezioni* 58–59.

32 Cicero, *Tusc. Disp.* I, 16, 39: 'Magni autem est ingenii sevocare mentem a sensibus et cogitationem ab consuetudine abducere'.

33 'Ingenium [...] est extensio intellectus ad incognitorum cognitionem'. de La Rochelle Jean, *Tractatus de divisione multiplici potentiarum animae*, ed. P. Michaud-Quantin (Paris: 1964) 96, where it is opposed to, among other terms, *experientia*, which is 'certitudo rerum facta per sensum'. The idea was authoritative, and could be found in the *De spiritu et anima* (wrongly) attributed to Augustine. See Lynch K.L., *The High Medieval Dream Vision: Poetry, Philosophy, and Literary Form* (Stanford, Calif.: 1988) 207, n. 48. The phrase was quoted by Cristoforo Landino in a definition of *ingegno* from his influential commentary on the *Divine Comedy*. See Alighieri D. – Landino C., *Comento di Christophoro Landino Fiorentino Sopra la Comedia di Danthe Alighieri Poeta Fiorentino* (Brescia: 1487), unpaginated, *ad Inferno*, 2, 'o alto ingegno'.

inoperative in the observation of nature and its visual rendition in pictures.<sup>34</sup> Leonardo, who had some familiarity with the philosophical tradition, demonstrates an awareness of this conceptualization when he associates *ingegno* with the work of poets, and *fantasia* with that of painters: 'if you call painting mechanical because it is primarily manual, in that the hands depict what is found in the imagination [*fantasia*], you writers draft with your hands what is found in your *ingegno*.'<sup>35</sup>

The legacy of *De anima* was the notion that *phantasia*—the imagination—enabled the apprehension of visual images. *Phantasia* served as the missing link between the material world and the intellectual world, granting the possibility of empirical knowledge.<sup>36</sup> Italian philosophy at the dawn of the sixteenth century was marked by the publication of the first *ad hoc* treatise on the faculty of imagination, Gianfrancesco Pico's *De imaginatione* (1501), in which this argument was cogently rehearsed:

Since man is constituted of the rational soul and body, and is, so to speak, a conjunction of the two; and since the substance of the spiritual soul is very different from the earthly structure of the body; it naturally followed that the extremes were joined by a suitable mean, which in some way should partake of the nature of each, and through which the soul, even when united to the body, should perform its own functions. What communication would the rational part have with the irrational, if there were not phantasy [*phantasia*] intermediate, somehow to prepare for reason the inferior nature, and to set up this nature to be cognized?<sup>37</sup>

34 This does not prevent early modern commentators from speaking of the natural abilities of a painter in terms of *ingegno* for laudatory purposes, in spite of the particular connotations of this term in faculty psychology. For a survey of the application of the word *ingegno* to artists in the fifteenth century, see Kemp, "Mimesis to Fantasia" 384–398.

35 da Vinci Leonardo, *Leonardo on Painting*, eds. and trans. M. Kemp – M. Walker (New Haven – London: 1989) 46, with 'mind' for *ingegno*. We may interpret this as Leonardo's response to authors who explicitly deny *ingegno* to visual artists. This was the case of Angelo Decembrio in *De politia litteraria*, where Leonello d'Este states that 'the ingenuity of writers [...] is a divine thing and beyond the reach of painters'. See Baxandall, "A Dialogue" 320, later discussed in Kemp, "Mimesis to Fantasia" 386–389.

36 On *phantasia* in Aristotle, see in particular Frede D., "The Cognitive Role of Phantasia in Aristotle", in Nussbaum M.C. – Rorty A.O. (eds.), *Essays on Aristotle's De anima* (Oxford: 1995) 279–295.

37 Pico della Mirandola Gianfrancesco, *On the Imagination*, ed. and trans. H. Caplan (Westport, Conn.: 1971) 41 (chap. VI). On imagination in sixteenth-century philosophy, see notably Park K., "Picos *De Imaginatione* in der Geschichte der Philosophie", in Kessler E.

The bedrock of early Cinquecento art theory was still the imitation of nature (*mimesis*), which implied that the artist should have a particular conversancy with the phenomenal world. Therefore, it seems clear that from a philosophical perspective imagination (or *fantasia*), and not *ingegno*, would be considered essential to the creative act.<sup>38</sup> The question of which mental faculty was involved in artistic practice was an important concern in early art theory propounded by Varchi at the Accademia Fiorentina, his lectures can be read as an effort to harmonise the Neoplatonic elements of Michelangelo's writings with Varchi's own scholastic tendencies. As we shall see, in doing so, Varchi confirms the central role of *fantasia* in artistic creation, while crucially opening up the possibility of pictorial *ingegno* by suggestively assimilating *fantasia* to *ingegno*.

In a lecture he gave on 6 March 1547 (one week before his address on the *paragone*), Varchi proposed a commentary on Michelangelo's poem, *Non ha l'ottimo artista alcun concetto*.<sup>39</sup> In this text, Michelangelo affirms that a sculptor works

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(ed.), *Über die Vorstellung = De imaginatione: lateinisch-deutsche Ausgabe* (München: 1984) 16–40; Park K., *The Imagination in Renaissance Psychology*, M.Phil. Dissertation (Warburg Institute: 1974); Spruit L., *Species intelligibilis: from Perception to Knowledge* (Leiden: 1995); Tirinnanzi N., *Umbra naturae: l'immaginazione da Ficino a Bruno* (Rome: 2000); Kavey A. (ed.), *World-building and the Early Modern Imagination* (New York: 2010).

38 On imagination in Renaissance art theory, see in particular Kemp, "Mimesis to Fantasia"; Summers D., *Michelangelo and the Language of Art* (Princeton, N.J.: 1981); Krüger K. – Nova A., "Einleitung", in Krüger K. – Nova A. (eds.), *Imagination und Wirklichkeit: zum Verhältnis von mentalen und realen Bildern in der Kunst der frühen Neuzeit* (Mainz: 2000) 7–11; Swan C., "Eyes Wide Shut: Early Modern Imagination, Demonology and the Visual Arts", *Zeitsprünge. Forschungen zur Frühen Neuzeit* 7, 4 (2003) 560–581; Parshall P., "Graphic Knowledge: Albrecht Dürer and the Imagination", *The Art Bulletin* 95, 3 (2013) 393–410; Seiler P., "Trovare cose non vedute. Naturnachahmung und Phantasie in Cennino Cenninis *Libro dell'arte*", in Brüllmann P. – Rombach U. – Wilde C. (eds.), *Imagination, Transformation und die Entstehung des Neuen* (Berlin: 2014) 111–154.

39 This lecture was published integrally in Buonarroti Michelangelo, *Le rime di Michelangelo Buonarroti, pittore, scultore e architetto*, ed. C. Guasti (Florence: 1863), LXXXV–CXII, and partially in Barocchi P. (ed.), *Scritti d'arte del Cinquecento* (Milan – Naples: 1971) vol. 2, 1322–1341. For a list of the previous editions, see Andreoni A., *La via della dottrina: le lezioni accademiche di Benedetto Varchi* (Pisa: 2012) 20, n. 27. On the lecture, see Carlson R., "Eccellentissimo poeta et amatore divinissimo: Benedetto Varchi and Michelangelo's Poetry at the Accademia Fiorentina", *Italian Studies* 69, 2 (2014) 169–188. On Varchi's theory of imagination, see also Quiviger F., "Benedetto Varchi and the Visual Arts", *Journal of the Warburg and Courtauld Institutes* 50 (1987) 219–224; Siekiera A., "Identità linguistica del Vasari 'artefice'", in Corrain L. – Di Teodoro F.P. (eds.), *Architettura e identità locali* (Florence: 2013) 113–123; Sgarbi, "Varchi on the Soul".

according to a visual *concetto* in his mind, the realization of which requires that 'the hand obey the intellect [*la man ubbidisce all'intelletto*]'.<sup>40</sup> Given the hierarchy of mental faculties implied in his philosophical system, Varchi was concerned with Michelangelo's Neoplatonic use of the term *intelletto*.<sup>41</sup> What he really meant, Varchi argued, was *fantasia*.

The word *intelletto* means many things [...] but in this very passage it should be understood otherwise, namely as the faculty, or virtue, which is called *immaginazione* or *fantasia*, which we have discussed several times, and which is not only distinct from the *intelletto*, but different, because the latter is immortal according to the best Philosophers, while the former is, without a doubt and according to all, mortal. And although it composes, divides, and finally reasons [*discorre*] (like the rational Soul), nonetheless it does not reason with universal entities, but only with particular ones.<sup>42</sup>

Varchi also rephrased *concetto* as 'the imagined thing', and 'not having a *concetto*' as 'not imagining, not being able to simulate in the *fantasia*', thus reaffirming the centrality of imagination.<sup>43</sup> He did, however, incorporate a pivotal element of Neoplatonism into his theory by admitting that this *concetto*, now

40 For the poem and its translation, see Buonarroti M., *The Poetry of Michelangelo: an Annotated Translation*, ed. and trans. Saslow J.M. (New Haven, Conn.: 1991) 302, no. 151.

41 Interestingly Varchi, as a philosopher and not an artist, could be confident in saying that he would write 'ubbidendo la mia lingua all'intelletto [with my language obeying my intellect]', pastiching Michelangelo (Varchi, *Due lezioni* 11). For Gelli, the reason why the intellect fails to grasp abstract entities (such as God) is that it 'turns to the *fantasia*' which is 'material and sensible' thus incapable of rendering any of the object's qualities, 'as said Cardinal Bessarion, most excellent Platonist'. See his May 1549 lecture at the Accademia Fiorentina, in: Gelli Giovanni Battista, *Lezioni petrarchesche*, ed. C. Negroni (Bologna: 1969) 249.

42 'Questo nome Intelletto significa più cose [...] ma in questo luogo si piglia altramente, ciò è per quella potenza o virtù che si chiama immaginazione, o vero fantasia, della quale avemo ragionato più volte, la quale non solamente è differente dall'intelletto, ma diversa, essendo quello immortale appresso i più veri filosofi, e questa appresso tutti e senza alcun dubbio mortale. E se bene compone, divide e finalmente discorre come l'anima razionale, discorre però non le cose universali, come quella, ma solamente le particolari'. Varchi, *Due lezioni* 30–31, also in Barocchi, *Scritti* vol. 2, 1337. Varchi further suggests that Michelangelo was in fact talking about what John Philoponus (Giovanni Gramatico) called the 'passive intellect [*intelletto passibile*]', which is just another word for the imagination (for his source text, see Quiviger, "Varchi and the Visual Arts" 223 and n. 39).

43 Varchi, *Due lezioni* 21.

object of the *fantasia*, could be equated with the Platonic idea. Thus, if Varchi seemed reluctant to consider the artist's model as a *universal* entity, as evidenced by the passage quoted above, he nonetheless granted it the status of the *immaterial*.<sup>44</sup> It is through this transubstantiation of the object of imagination, from corporeal to incorporeal, that Varchi makes *ingegno* a potential agent in the mental task of image-making, as this passage suggests:

Not all masters know how to imagine beautiful [things], nor to carry to perfection what they have imagined, because on top of what the Greeks name *idea* [...], namely the image that one forms in the *fantasia* each time one creates, art and practice are also required.<sup>45</sup> Hence he who does not possess [art and practice] may imagine well and execute poorly, because for the manual arts the *ingegno* does not suffice; exercise is also required. [...] The only real master is the one who can perfectly execute with his hands what he perfectly imagined with his brain.<sup>46</sup>

Varchi's line of reasoning subtly reveals his increasing willingness to associate *ingegno* with the image-making process. Indeed, after arguing that 'the images

44 For Michelangelo's and Varchi's reception of Platonic idea theory, see the classic Panofsky E., *Idea: a Concept in Art Theory* (New York: 1968) 115–126.

45 Varchi lists an impressive array of synonyms for the *idea*: *forma*, *specie* or *spezies*, *immagine*, *sembianza*, *exemplar* or *esemplare*, *esempio*, *similitudine*, *intenzione*, *concetto*, *modello*, *simulacro* or even *fantasma* (Varchi, *Due lezioni* 18 and 25).

46 '[N]on tutti i maestri ve le sanno immaginare belle a un modo, né condurre a perfezzione egualmente quelle che si sono immaginati eglino stessi. Percioché, oltre quello che i Greci chiamano *idea* [...], cioè è quella imagine che si forma ciascuno nella fantasia, ogni volta, che vuole fare che che sia, si ricerca ancora l'arte e la pratica; onde chi non ha queste potrebbe immaginar bene et operare male, perché nell'arti manuali non basta l'ingegno, ma bisogna l'esercitazione [...]; ma quello è solo vero maestro che puo perfettamente mettere in opera colle mani quello che egli s'è perfettamente immaginato col cervello'. Varchi, *Due lezioni* 18, also in Barocchi, *Scritti* vol. 2, 1323–1324. On the role of practice, see Mendelsohn, *Paragoni* 100. The passage also echoes Alberti's *De pictura* on 'quella idea de la bellezza, ch'a pena gli eccellentissimi ingegni possono discernere [this idea of beauty, that the most subtle *ingegni* can barely discern]'. See Alberti Leon Battista, *La pittura di Leonbattista Alberti*, trans. L. Domenichi (Venice, Gabriel Giolito de Ferrari: 1547) 40. Domenichi's translation of *De pictura*, from which I quote, was certainly the first widely accessible vernacular version. At least it was the one known to Vasari, who recorded that 'Alberti wrote three books *On Painting*, today translated into the Tuscan language by Messer Ludovico Domenichi'. Quoted in Alberti L.B., *On Painting. A New Translation and Critical Edition*, ed. and trans. R. Sinigalli (Cambridge: 2011) 11. Note the publication date: 1547.



in one's *fantasia* are not enough, practice is also required', he restates his claim that 'the *ingegno* does not suffice, practice is also required', thereby establishing a parallel between *fantasia* and *ingegno*. From a writer so accustomed to neatly distinguishing the faculties of the mind, this tendency is a sign of the fluidity of the notion of *ingegno* in his time.<sup>47</sup> Furthermore, other passages betray his inclination to associate *ingegno* with imagination, as, for example, when he writes of something 'immaginato collo ingegno'.<sup>48</sup> In sum, Varchi inherits theories of cognition which tend to distinguish higher, intellectual mental powers—including *ingegno*—from low and material *fantasia*. Yet he fosters the assimilation of *ingegno* and *fantasia* by positing that the objects of *fantasia*, being Platonic ideas, are not material but primarily intellectual.

### Minerva in the Forge of Vulcan

It is significant that the two most important authors writing about Michelangelo after the publication of Varchi's lectures both praised Michelangelo's imagination. In 1553 Ascanio Condivi (1525–1574), a keen reader of the *Due lezioni*, underlined Michelangelo's supremely powerful 'virtù imaginativa'.<sup>49</sup> In the second edition of his *Vite* (1568), Vasari amended his biography of Michelangelo by inserting praise of his 'immaginativa' in a passage particularly relevant here, in which he calls the artist 'questo ingegno'—a term one is tempted to translate as 'this genius':<sup>50</sup>

47 Michelangelo's magnificence, Varchi once wrote, is so great that 'non puo nè comprendere intelletto, nè immaginare fantasia, nè ritener memoria [neither can the intellect comprehend it, nor the *fantasia* imagine it, nor memory retain it]', in Varchi Benedetto, *Orazione funerale [...] nell'essequie di Michelagnolo* (Florence, Giunti: 1564) 65.

48 Varchi, *Due lezioni* 16. Varchi is, however, sensitive to the non-empirical nature of *ingegno* when he attributes to the *ingegno* the ability, for a sculptor, to work his chisel 'in places where the eyes can barely reach' or in cases where, like for Michelangelo's *Moses* which he cites, the block is too big to be apprehended visually in its entirety while sculpting (Varchi, *Due lezioni* 106). Here, as in the tradition, the *ingegno* seems to be the ability of performing a *cognitio incognitorum* (see above n. 33).

49 Vasari Giorgio, *Le vite di Michelangelo Buonarroti*, ed. K. Frey (Berlin: 1887) 210, cited in Vasari, *Vita di Michelangelo* vol. 4, 1846, n. 699.

50 Few uses of *ingegno* in Varchi already point in this direction: 'tanti grand'uomini e così peregrini ingegni' (Varchi, *Due lezioni* 101); 'Mag. Lorenzo de'Medici vecchio, il quale conobbe, volle, seppe, et potette innalzare sì grande ingegno [i.e. Michelangelo's]' (ibid. 53).

Michelangelo had such a distinctive and perfect imagination [*immaginativa*] and the works he envisioned were of such a nature that he found it impossible to express such grandiose and awesome conceptions [*concetti*] with his hands, and he often abandoned his works, or rather ruined many of them, as I myself know, because just before his death he burned a large number of his own drawings, sketches and cartoons to prevent anyone from seeing the labours [*fatiche*] he endured or the ways he tested his *ingegno*, for fear that he might seem less than perfect. [...] And although [these drawings] display the greatness of this *ingegno*, they also reveal that when he wanted to bring forth Minerva from the head of Jupiter he needed Vulcan's hammer.<sup>51</sup>

Vasari's final remark is, of course, a disguised reference to the exchange between Michelangelo and Varchi quoted above. However, Vasari adds the fact that what comes out of Jupiter's head is Minerva, a detail Michelangelo had omitted. Since Latin antiquity, Minerva was associated with *ingenium* and rhetorical talent.<sup>52</sup> The parallel had been applied to the *ingenia* of poets, as

51 'Ha avuto l'immaginativa tale e sì perfetta, che le cose propostosi nella idea sono state tali che con le mani, per non potere esprimere sì grandi e terribili concetti, ha spesso abbandonato l'opere sue, anzi ne à guasto molte, come io so che, innanzi che morissi di poco, abruchò gran numero di disegni, schizzi e cartoni fatti di man sua, acciò nessuno vedessi le fatiche durate da lui et i modi di tentare l'ingegno suo, per non apparire se non perfetto. Et [io ne ho alcuni di sua mano trovati in Fiorenza, messi nel nostro Libro de' disegni, dove,] ancora che si vegga la grandezza di quello ingegno, si conosce che, quando e' voleva cavar Minerva della testa di Giove, ci bisognava il martello di Vulcano'. Vasari, *Vita di Michelangelo* vol. 1, 117; Vasari, *Le vite* vol. 6, 108–109; translation from Vasari, *The Lives* 472. Vasari clearly knew Varchi's first lecture, as he mentions it elsewhere in his life of Michelangelo. We may wonder why his praise of imagination does not already feature in the first edition of the *Vite* (Florence, Torrentino: 1550). It is likely that Vasari attended the lecture on 6 March 1547, as the lecture was public, and he was certainly also invited to the one on 13 March since he had participated in the poll. His manuscript of the *Vite* was perhaps already too advanced to be reworked. See Giovio's letter about the completion of the *Vite* on 8 July 1547, and Domenichi's letter about printing the book on 15 October, in Frey K. (ed.), *Giorgio Vasari: Der literarische Nachlass* (Hildesheim: 1982) vol. 1, 199, 202.

52 On the birth of the association between Minerva and *ingenium*, see Morgan L., "On the Good Ship *ingenium*: *Tristia* 1.10", in Hunter R.L. – Oakley S.P. – Reeve M.D. (eds.), *Latin Literature and its Transmission: Papers in Honour of Michael Reeve* (Cambridge: 2016) 245–264, 255–257. In relation to Cicero's rhetorical talent, Minerva was called 'teacher of the arts', and some suggest this is because Cicero was educated in Athens, namely Athena-Minerva. See Harrison S., "Cicero's *De temporibus suis*: The Evidence Reconsidered", *Hermes* 118, 4 (1990) 455–463, 461.

in an encomium of Dante (long attributed to Boccaccio but most probably of sixteenth-century vintage) where on top of praise for his *alta fantasia* Dante is named ‘the obscure Minerva’:

Dante Aligeri [*sic*] son, Minerva  
 oscura  
 D'intelligenza, e d'arte, nel cui  
 ingegno  
 L'eleganza materna aggiunse al  
 segno  
 Che si tien gran miracol di  
 natura  
 L'alta mia fantasia pronta e  
 sicura  
 Paßò 'l Tartareo, e poi 'l celeste  
 regno;  
 E 'l nobil mio volume feci degno  
 Di temporal, e spiritual lettura.

I am Dante Alighieri, obscure Minerva  
 Intelligent and artful, in whose *ingegno*  
 Maternal elegance unites with the sign  
 That is considered a great miracle of  
 nature  
 My high *fantasia* ready and assured  
 Went through Tartarus and in the  
 kingdom of heaven  
 And I made my noble book worthy  
 Of both temporal and spiritual  
 reading.<sup>53</sup>

The survival into the Renaissance of the association of a deity with an idea or concept—in particular, Minerva with *ingegno*—comes as no surprise.<sup>54</sup> This allegorical mode underwent considerable expansion in the age of Vasari. Following the mid-Cinquecento surge of interest in emblematics and symbolism, artists increasingly used personifications to derive visual representations of complex notions such as the relationship between different concepts, or something like a theory.<sup>55</sup> We may ask ourselves whether the reception of Varchi's lectures did not give rise to pictorial attempts of this kind. As far as

53 'Sonetto di M. Gio. Boccaccio in lode di Dante', in: Alighieri Dante, *La divina comedia di Dante con la dichiarazione de' vocaboli piu importanti*, ed. L. Dolce (Venice, Domenico Farri: 1578), unpaginated, directly after the dedication. The last verse shows an endorsement of Dante's view (*Convivio*, II, 1) that secular poetry is also amenable to the theologians' four levels of interpretation, applied in turn to the very *Commedia*. The sonnet has been widely published as an epigraph to the *Commedia* through the Renaissance. See Gilson S.A., *Dante and Renaissance Florence* (Cambridge: 2005) 242, n. 28. Its attribution to Boccaccio has been challenged. See Wilkins E.H., "The Sonnet 'Dante Alighieri Son ...'", *Modern Language Notes* 26, 5 (1911) 137–139.

54 On this phenomenon in general, see Seznec J., *The Survival of the Pagan Gods: the Mythological Tradition and its Place in Renaissance Humanism and Art* (New York: 1953).

55 On this dynamic, see Fenech Kroke A., *Giorgio Vasari: la fabrique de l'allégorie* (Florence: 2011), esp. chap. 2, II, 'La personnification entre philosophie et rhétorique'.

his 1547 discussion of the relation between *ingegno* and *fatica* is concerned, we ought to consider a small painting on copper by Vasari now in the Uffizi Gallery, Florence. Known as *The Forge of Vulcan*, it also has been referred to under the title of *Ingenium and Ars* [Fig. 3.2].<sup>56</sup>

Vincenzo Borghini (1515–1580)—a Benedictine monk and philologist, and Vasari's foremost advisor on all matters iconographic—devised the painting's *invenzione*. His initial idea survives in a manuscript in Borghini's hand and addressed to Vasari.<sup>57</sup> Borghini suggested a depiction of Vulcan forging Achilles's shield following the descriptions of Homer and Virgil, but 'adapted to our purpose [*il proposito nostro*], as we have mused together', where Thetis, who commissioned the shield, would be replaced by Minerva.<sup>58</sup> Vasari painted Borghini's 'blazing furnace' and 'three naked young men making various weapons and armors', with assistants and *putti*.<sup>59</sup> He also rendered Minerva holding a set square and a pair of compasses, emblems of theory, pointing to her prominent (pregnant?) belly.<sup>60</sup> Vasari departed from the *invenzione* with

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- 56 The title *Ingenium et Ars* is for example adopted in Mertens V., *Die drei Grazien: Studien zu einem Bildmotiv in der Kunst der Neuzeit* (Wiesbaden: 1994) 398. For a bibliography on the painting, see Cecchi A. – Baroni Vannucci A. – Fornasari L. (eds.), *Giorgio Vasari. Disegnatore e pittore*, exh. cat., Galleria Comunale d'Arte Moderna e Contemporanea (Milan: 2011), no. 34, to which should be added Lecoq A.-M., "Vasari et le bouclier d'Achille", in Capodiecchi L. – Ford P. (eds.), *Homère à la Renaissance: Mythe et transfigurations* (Paris – Rome: 2011) 345–360; Ruffini M., *Art without an Author: Vasari's Lives and Michelangelo's Death* (New York: 2011) 64; Reitz E., "Die Schmiede des Vulkan als Spiegel des Selbst", in Fleckner U. – Steinkamp M. – Ziegler H. (eds.), *Der Künstler in der Fremde: Migration – Reise – Exil* (Berlin – Boston: 2015) 27–45; Härb F., *The Drawings of Giorgio Vasari (1511–1574)* (Rome: 2015) 519–521. A publication by Alexander Linke about the painting is in preparation. I am grateful to Dr Linke for discussing his research with me, and to Lorraine de la Verpillière for bringing Lecoq's essay to my attention.
- 57 Biblioteca Nazionale Centrale, Florence, Magl. II.X.114, 50. Reproduced in Scoti-Bertinelli U., *Giorgio Vasari scrittore* (Pisa: 1906) 95, n. 1, and also in Mertens, *Die Drei Grazien* 174, n. 3. The manuscript is known to scholarship as the 'inventioni per pitture fatte'. For a detailed commentary of the text, see Belloni G. – Drusi R. (eds.), *Vincenzo Borghini: filologia e invenzione nella Firenze di Cosimo I* (Florence: 2002) 103–107. On Borghini's relation to Vasari, see Williams R., "Vasari and Vincenzo Borghini", in Cast D.J. (ed.), *The Ashgate Research Companion to Giorgio Vasari* (Farnham: 2014) 23–40.
- 58 Scoti-Bertinelli, *Vasari scrittore* 95, n. 1: '[...] accommodato al proposito nostro, come habbiamo ragionato insieme'.
- 59 On the shield, a Capricorn and an Aries—zodiacal signs of Cosimo I and Francesco I de' Medici—hold a globe.
- 60 On the links between pregnancy and *ingegno*, see Marr, "Pregnant Wit"; on pregnancy and artistic creativity with special attention to the figure of Vulcan, see Pfisterer U.,



FIGURE 3.2 *Giorgio Vasari, The Forge of Vulcan (1564). Oil on copper, 38 × 28 cm. Florence, Uffizi, inv. 1558.*

regard to the interaction between the two gods. While Borghini wanted Vulcan to be showing the shield to Minerva, Vasari painted Vulcan actively sculpting while looking at a sheet of paper shown to him by the goddess. This sheet is the *disegno*, or project drawing, for the piece.<sup>61</sup> The drawing is in the hands of the deity associated with the mind, in keeping with the ideal definition of *disegno* in Vasari's *Vite* (1568) as an 'expression of the *concetto* imagined in the mind'.<sup>62</sup> Vasari thus fully exploits the polysemy of the word *disegno* which, in addition to a drawing, could also signify the product of thought (*disegnare* meant 'to think').<sup>63</sup>

Vasari's image mirrors the mutual dependence of conception and execution, while suggesting the interrelationship of the *inventore* (Borghini) and the *artefice* (Vasari himself).<sup>64</sup> Indeed, some authors described the relationship between *ars* and *ingenium* as an inseparable unity, and even compared it to the conjunction between mind and body. In the chapter 'Ars et Ingenium' of his *Hieroglyphica* (1556) Pierio Valeriano Bolzano mentions a story of the marriage between Pallas (Minerva) and Vulcan which was appropriated by the ancients 'as seen in the Orphic hymns' to explain that Minerva's and Vulcan's respective strengths coexist in each being.<sup>65</sup> This, writes Valeriano, is the reason why

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"Zeugung der Idee—Schwangerschaft des Geistes", in Pfisterer U. – Zimmermann A. (eds.), *Animationen, Transgressionen: das Kunstwerk als Lebewesen* (Berlin: 2005) 41–72.

61 Here I follow Julian Kliemann in Corti L. – Davis M.D. (eds.), Giorgio Vasari: principi, letterati e artisti nelle carte di Giorgio Vasari, exh. cat., Casa Vasari (Florence: 1981) *contra* Härb, *Drawings of Vasari* 520, who sided with Kliemann's first opinion (Kliemann J., "Zeichnungsfragmente aus der Werkstatt Vasaris", *Jahrbuch der Berliner Museen* 20 (1978) 157–208, 167) that the paper should have carried a *motto* which Borghini sent too late.

62 '[...] esso disegno altro non sia che una apparente espressione e dichiarazione del concetto che si ha nell'animo, e di quello che altri si è nella mente imaginato e fabbricato nell'idea'. Vasari, *Le vite* vol. 1, 111.

63 Venuti Filippo, *Dittionario volgare, e latino* (Venice, Giovanni Andrea Valvassori: 1574) column 301. *Disegnare* means *deliberare*.

64 Härb, *Drawings of Vasari* 521.

65 Valeriano Bolzano Pierio, *Hieroglyphica sive de sacris Aegyptiorum literis commentarii* (Basel, Michael Isengrin: 1556) Lib. XVIII, 135 (this edition also features the portrait of Valeriano, crowned by Hermes and Pallas-Minerva). This source was first pointed out by Winner M., "Gemalte Kunsttheorie: Zu Gustave Courbets 'Allégorie réelle' und der Tradition", *Jahrbuch der Berliner Museen* 4 (1962) 150–185, 160. It was further explored in Mertens, *Die Drei Grazien* 175, and reassessed in Lee H., *Kunsttheorie in der Kunst: Studien zur Ikonographie von Minerva, Merkur und Apollo im 16. Jahrhundert* (Frankfurt am Main: 1996) 18–21.

androgyny, or the coincidence of female and male, was regarded as a sign of higher perfection in antiquity.<sup>66</sup>

Of particular relevance is a short passage in Vincenzo Cartari's *Imagini de i dei degli antichi* (Venice, 1571), where Minerva is directly associated with artistic invention. The arts are said to have been given to men by Prometheus, but were in fact created by Minerva,

[...] because the human *ingegno* has discovered all the things we create, and keeps discovering every day, and does it by means of fire, given that in all arts two things are necessary: one is industry [*industria*] and invention [*inventione*], the other is the act of executing the work, and doing what the *ingegno* has designed. The former is signified by Minerva, and the latter by Vulcan, namely by fire, since by the name of Vulcan we mean the fire which is used to make all things.<sup>67</sup>

The text then echoes the very same concerns discussed above regarding the immateriality of *ingegno* in relation to the materiality of art practice:

It is true that art cannot always put into effect what the *ingegno* invents, because art is connected to the body, and cannot leave it or do more than the body can do, while the *ingegno* often departs from it, and muses at leisure considering the works of nature and the creation of God, and sometimes imagines doing similar things, the products of which, however, can never be seen because they are just vain imaginings [*imaginationi vane*].<sup>68</sup>

66 The belief in the superiority of androgynes, which probably comes from Plato's *Symposium* (Speech of Aristophanes, 189e), manifested itself powerfully in the *Rosarium philosophorum* (1550) as signifying that perfection is achieved by the alchemical combination of opposites.

67 '[...] perche l'ingegno humano ha trouato ciò che tra noi si fa, e troua anco tutto di, e fallo con il mezzo del fuoco, conciosia che in tutte le arti due cose faccino di bisogno. L'una è l'industria, e la inuentione, l'altra il porre in opera, e fare quello che l'ingegno ha disegnato. Quella s'intende per Minerua, questo per Volcano, ciò è pel fuoco, che sotto il nome di Volcano è inteso il fuoco il quale ci è istromento à fare tutte le cose'. Cartari Vincenzo, *Le imagini de i dei degli antichi* (Venice, Giordano Ziletti: 1571) 387.

68 'Gli è ben uero, che non puo sempre l'arte porre in effetto tutto quello che l'ingegno troua, perche quella sta legata al corpo, e non puo da lui partire, ne fare piu di quanto egli puo, ma questo lo lascia souente, e discorre à suo piacere considerando l'opere della natura, e quello che fa Dio, & imagina talhora di fare anch'egli cose simili, di che non si uede però mai effetto alcuno, perche sono imaginationi uane'. Cartari, *Imagini* 387.

These passages from Cartari and Valeriano were identified early on by scholars as potential sources for the iconography of Vasari's *Forge of Vulcan*.<sup>69</sup> Yet we may ask whether the main *telos* of the picture is not chiefly to respond to Varchi's discussion of the dynamic relationship between *ingegno* and *fatica*, and to affirm the equal importance of both. As recent findings have shown, the painting was made between May and October 1564.<sup>70</sup> This coincides with a period of renewed interest in Varchi's *Due lezioni* in the context of the creation of the Accademia del Disegno, the first modern academy of art.<sup>71</sup> Emulating the Accademia Fiorentina, the Accademia del Disegno was founded on 13 January 1563 by Cosimo I de' Medici on the initiative of Vasari, with Borghini as its vice-president (*luogotenente*).<sup>72</sup> We know from a letter to Vasari (dated 14 February 1564) that Borghini was deeply engaged in the study of Varchi's *Due lezioni* at the time.<sup>73</sup> Notably, he attempted to provide a theoretical basis for the valuation of *fatica*, through a distinction between purely corporeal *fatica* and what he called *fatica maestrale*, a form of prowess unique to great masters who invent their own *concetti*.<sup>74</sup> It would thus not be surprising if the 'proposito nostro' of which Borghini spoke in his *invenzione* for the painting were a discussion about the Varchian dichotomy of *ingegno* and *fatica*.<sup>75</sup>

In this light, it is worthwhile to reconsider the sonnets which Vasari and Varchi exchanged around the same period. We know that Varchi addressed to the Aretine a poem beginning with the verse *Quant'avete maggior l'ingegno, e l'arte* (*The greater the ingegno and arte [here: skill] you possess [...]*) to which the

69 For the scholarship on the picture's iconography, see note 56 above. On the sources of Vasari and Borghini's allegories and the role of Cartari and Valeriano's texts, see Fenech Kroke, *Giorgio Vasari* 22 and *passim*.

70 Cecchi et al., *Giorgio Vasari*. Disegnatore e pittore no. 34.

71 Varchi, *Paragone* 60–64.

72 On this institution see in particular Barzman K.-E., *The Florentine Academy and the Early Modern State: the Discipline of Disegno* (Cambridge: 2000), and the compendium Meijer B.W. – Zangheri L. (eds.), *Accademia delle Arti del Disegno: studi, fonti e interpretazioni di 450 anni di storia* (Florence: 2015).

73 Barocchi P., "Una 'Selva di notizie' di Vincenzio Borghini", *Un Augurio a Raffaele Mattioli* (Florence: 1970) 87–172, 89.

74 Barocchi, "Una 'Selva di notizie'", 150–152, esp. 160. On this passage see Feser S., "Geschmiedete Kunst: Vasaris selbsternanntes Erstlingswerk "Venus mit den drei Grazien" im Kontext seiner Autobiographie", in Burzer K. et al. (eds.), *Le Vite del Vasari: genesi, topoi, ricezione* (Venice: 2010) 53–66, 55–57, and Jonietz, "Labor omnia vincit?", 593–594.

75 The idea of a bespoke 'proposito nostro' recalls Vasari's notion of an allegorical 'senso nostro'. See McGrath E., "Il senso nostro: The Medici Allegory Applied to Vasari's Mythological Frescoes in the Palazzo Vecchio", in Garfagnini G.C. (ed.), *Giorgio Vasari: tra decorazione ambientale e storiografia artistica* (Florence: 1985) 117–134.



artist replied with the sonnet *Varchi io conosco ben l'ingegno, e l'arte* (*Varchi, I know well the ingegno and the arte*).<sup>76</sup> The poems do not directly address the relationship between intellectual and manual work, but they focus on one's duty to worship God for the gifts he has bestowed upon us, especially artistic talent. Vasari's response sonnet later mentions the value of the pair of compasses and the set square (the tools held by Minerva in his copper painting) for 'refining the *arte* and the *ingegno*'. We may hypothesise that this particular exchange veils an art-theoretical subtext—the same subtext underlying the iconography of the *Forge of Vulcan*. In the field of poetry, then, the *ingegno/fatica* pair would have mutated back into the Horatian couple of *ingegno/arte*.<sup>77</sup>

The most striking feature of Vasari's painting is the way in which the duality of *ingegno/fatica*, respectively *ingegno/arte*, is reflected in the architecture of the space depicted. Borghini concluded his *invenzione* by granting Vasari freedom with regard to the background, specifying only that he should 'keep in mind not to do the workshop of a smith so much as a dignified Academy of virtuosi [*Accademia di certi virtuosi*] in which Minerva appears'.<sup>78</sup> In fact, Vasari included both the smithy and the Academy, clearly dividing the architecture

76 The sonnets were first published in: Varchi Benedetto, *Sonetti spirituali* (Florence, Giunti: 1573), 46 (Varchi) and 92 (Vasari). Later in: Varchi B., *Opere di Benedetto Varchi*, ed. G.B. Busini (Trieste: 1858) vol. 2, 992 (Varchi only). Vasari's sonnet exists in another form in the Ms. Riccardiano 2948, fol. 7a, published in Scoti-Bertinelli, *Vasari scrittore* 268, however Scoti-Bertinelli failed to notice the difference between the two versions. On Vasari's poetry, with an assessment of Scoti-Bertinelli's edition of the ms., see Mattioda E., "Le poesie di Vasari dal Ms. Riccardiano 2948", in Baggio S. – Benigni P. – Toccafondi D. (eds.), *Giorgio Vasari: la casa, le carte, il teatro della memoria* (Florence: 2015) 203–214. On Varchi's poetry see Pirotti U., *Benedetto Varchi e la cultura del suo tempo* (Florence: 1971) 185–287; Chiodo D., "Varchi rimate: modi e forme della poesia di corrispondenza", in Bramanti V. (ed.), *Benedetto Varchi, 1503–1565* (Rome: 2007) 157–171. The poems bear no date. According to Pirotti the *Sonetti spirituali* are the work of a Varchi 'by now old and tired' (Pirotti, *Varchi e la cultura* 194), thus it seems plausible to date the exchange around 1563, when Varchi turned sixty.

77 This may be for theoretical reasons, but also for reasons of metre. Vasari seems to have struggled with metre, and Scoti-Bertinelli often denounced Vasari's 'verso [...] *ipermetro*!' (Scoti-Bertinelli, *Vasari scrittore* 268, in the footnotes, and see Mattioda, "Le poesie di Vasari", 208–211 for a reassessment of Scoti-Bertinelli's reading of Vasari's poetry). In Varchi's poetic work, the cluster 'ingegno e arte' is relatively frequent.

78 '[...] et questo vi sia sopra tutto a mente che non si facci tanto una bottega di fabro, quanto una Accademia di certi virtuosi, et degna ove venga Minerva'. Scoti-Bertinelli, *Vasari scrittore* 96 i.f., with Scoti-Bertinelli's faulty transcription corrected in Belloni – Drusi, *Vincenzo Borghini* 104.

into two spaces: the domains of *ingegno* (left) and of *fatica* (right).<sup>79</sup> The domain of *ingegno* has consistently been interpreted in the scholarly literature as reflecting Vasari's ideal vision of the Accademia del Disegno.<sup>80</sup> There is more at hand here, though, than an academy of art [Fig. 3.3]. Various elements suggest that Vasari alludes to Plato's allegory of the cave, and to a specific theoretical model of the origin of artistic ideas. The two spaces are set in dialogue by the contrasting symbolic use of light. While the realm of *fatica* is illuminated by the blazing furnace, the realm of *ingegno*, shrouded in darkness, is lit only by a chandelier. The young, naked students turn their backs to it. They copy from drawings pinned on a wall, but distinct rays of light shine

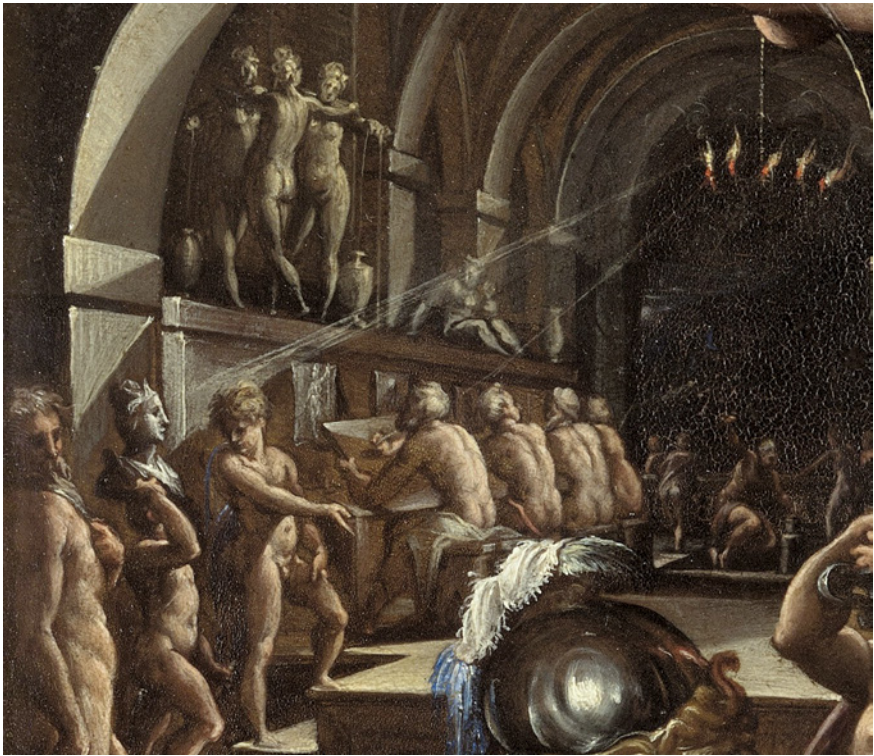


FIGURE 3.3 Detail from Fig. 3.2, top-left corner of the painting.

79 An early sketch shows that he initially set the entire scene in a forge, and thought up the realm of *ingenium* only later. See Härb, *Drawings of Vasari* 520, illustration no. 341.

80 Härb, *Drawings of Vasari* 520; Winner, "Gemalte Kunsttheorie" 159–160 (who called the painting 'das erste echte Akademiebild').

straight from the chandelier to the backs of their heads. In an arch above this wall, statues of three graces (Painting, Sculpture and Architecture, daughters of *disegno*) dance in harmony.

That this place may be read as a cavern was already suggested by Borghini, who spoke in his instructions of a 'caverna oscura'. Its resonance as a philosophical allegory will be evident if we compare it to the top-left corner of a design by Vasari which has been tentatively interpreted as the image of 'a philosopher', known to us from a copy [Fig. 3.4].<sup>81</sup> In this picture Vasari also proposed a twofold symbolic background, standing for the mundane temptations (right) and the virtues of philosophy (left).<sup>82</sup> The top-left corner is distinct from the other allegorical areas by virtue of its being peopled by adults rather than *putti*. This domain of the edifying contemplation of Ideas is echoed in the 'Accademia di certi virtuosi' of *The Forge of Vulcan*, which we may take to signify Minerva's cavern or storehouse of *ingenium*.

As we have noted, the rays of light streaming from the chandelier [Fig. 3.3] are directed to the backs of the art students' heads. That those shafts of light stand for the incandescence of inspiration is confirmed by the most prominent of them, which falls on the eyes of a bust. The statue is unrecognizable save for a Phrygian cap, attribute of the poet, and typically of Dante. A ray of light hitting the eyes of the figure recalls the last tercet of the *Commedia*, where divine truth is revealed to Dante as his mind (*mente*) is struck by a shaft of light (*fulgore*). The passage itself deals with the inability of the body to sustain the deep visions of the imagination, which Dante calls the *alta fantasia*.<sup>83</sup>

We may imagine Minerva's workshop at the upper left of *The Forge of Vulcan*, then, as a symbolic depiction of how the creative mind functions for Vasari. Students of art receive the light of the Forms through a non-empirical kind of perception, turning their back to the light like the prisoners of Plato's cave, unlike the incandescent poet Dante who can stare directly at it. Their role is that of the *fantasia*, translating vision into a *concetto* which, for the purposes of Vasari's promotion of *disegno*, takes the form of a sketch on paper. After all,

81 Reproduced and discussed in Härb, *Drawings of Vasari* 253 no. 109.1.

82 We can see it as further divided into four spaces: the earthly pleasures (bottom-right) opposed to the pleasures of study (bottom-left), and the foolish imaginations (top-right) opposed to the contemplation of beauty (top-left).

83 The expression *alta fantasia* was employed in the sonnet in praise of his *ingegno* quoted above. Interpreters at the time did read this passage through the lens of Aristotelian theories of the *phantasia*, as evidenced for example by Vellutello's commentary. See Alighieri D. – Vellutello A., *La comedia di Dante Alighieri con la nova esposizione di Alessandro Vellutello* (Venice: 1544), unpaginated, ad *Paradiso* XXXIII, v. 142. On the *alta fantasia*, see also Summers, *Michelangelo and the Language* 103–143.



FIGURE 3.4 *Unknown (copy after Vasari), Allegory (The Philosopher?).* Pen and brown ink, brown wash, heightened with white, on green-blue prepared paper, 409 × 280 mm. Modena: Galleria Estense, inv. 1292.



Gianfrancesco Pico della Mirandola had already described the *phantasia* as 'a blank picture [*nuda tabula*] on which nothing has been painted, nothing delineated' which 'the intellect brightens by its own light'.<sup>84</sup> This symbolic representation of the mind as an academy is also Vasari's affirmation of the specificity of the *ingegno* of an academically trained artist. While philosophers frequently envisioned the mind as an amphitheatre (most notably Giulio Camillo and his influential *theatro*) artistic *ingegno* is thought to resemble a different kind of amphitheatre: the classroom of an academy of art.<sup>85</sup>

It is also worth pointing out that the naked figure falling from the sky to crown Vulcan with laurel closely resembles the naked boy falling from the sky in Michelangelo's *Dream* drawing (c. 1533, London, Courtauld Gallery).<sup>86</sup> This would buttress the likelihood that Vasari meditated on Michelangelo's or Varchi's theories of artistic imagination, as the *Dream* is closely connected to the *Non ha l'ottimo artista alcun concetto* sonnet on which Varchi lectured. In the poem, Michelangelo likened the quest for the concretization of the *concetto* in the marble block to the impossible quest for his beloved. The same theme figures in Valeriano's reading of the love between Vulcan and Minerva, and Vasari too appears to invoke it, as his Vulcan seems to kneel in admiration before the goddess.

It has been suggested that Vasari's Vulcan is a disguised portrait of Benvenuto Cellini and even Vasari himself.<sup>87</sup> It seems more likely, given the foregoing,

84 Pico della Mirandola, *On the Imagination* 40–41 (chap. vi). The pictographic metaphor is probably inspired by Aristotle, *De anima* 427b24–6. The fact that Vasari embraced such a theory of imagination is clear from his writings. In the second edition of the *Vite* (1568)—in which a reference to Varchi's lecture of Michelangelo is made, showing Vasari's awareness of it—his initial definition of *disegno* is replaced by a characterization of it as 'apparent expression and declaration of the *concetto* which one has in the soul [*animo*], and of that which is imagined in the mind [*mente*] and fabricated in the *idea*'. See Vasari in Vasari, *Le vite*, I, 111, and Panofsky, *Idea* 60–63, esp. 63, who lists more passages from Vasari exhibiting a Neoplatonic tone. Minerva, who presides over the think tank, takes the best *concetto* to the eyes of the body, Vulcan, who will give them corporeal form through corporeal *fatica*. The fact that it takes a goddess to carry over the *disegno* is an interesting pagan anticipation of Federico Zuccari's view of *di-segno* as *segno-di-Di* (sign of God). See Zuccari Federico, *L'idea de' pittori, scultori et architetti* (Turin, Agostino Disserolio: 1607) 11, 83 (cap. 16), quoted in Panofsky, *Idea* 88.

85 On Giulio Camillo's *theatro*, see Bolzoni L., *The Gallery of Memory: Literary and Iconographic Models in the Age of the Printing Press* (Toronto – London: 2001).

86 On this drawing, see Buck S. (ed.), *Michelangelo's Dream*, exh. cat., The Courtauld Gallery (London: 2010). I am grateful to Alexander Marr for pointing this out.

87 For the Vulcan-as-Cellini reading, see Scalini M., *Benvenuto Cellini* (Florence – London: 1995) 41 and fig. 49, whose hypothesis was followed without discussion by Scholl D., *Von*

that Vasari's sturdy smith represents Michelangelo.<sup>88</sup> Consider the aforementioned anecdote that Vasari included in the *Vite* (1568), which associates Michelangelo's *ingegno* with Minerva and his strength with Vulcan. We should also bear in mind that the very months of the painting's genesis, between May and October 1564, were marked by the preparation of Michelangelo's great funeral ceremony in Florence, which took place on 14 July 1564 in the church of San Lorenzo.<sup>89</sup> The iconographical programme for this ceremony was conceived under the direction of Vasari and Borghini themselves, and it has been argued that Varchi may also have been directly involved.<sup>90</sup> The complex ensemble of works realised on this occasion featured a figure of Vulcan, as well as the only other known allegory of *ingegno* made in these years: a psychomachic statue of *Ingegno subduing Ignorance* by Vincenzo Danti (now lost), which stood prominently on Michelangelo's catafalque.<sup>91</sup> In this case *Ingegno* was

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den "Grottesken" zum Grotesken: die Konstituierung einer Poetik des Grotesken in der italienischen Renaissance (Münster: 2004) 414. This, however, is highly unlikely, given the intense rivalry between Cellini and Vasari (see Gardner Coates V.C., "Rivals with a Common Cause: Vasari, Cellini, and the Literary Formulation of the Ideal Renaissance Artist", in Cast D.J. (ed.), *The Ashgate Research Companion to Giorgio Vasari* (Farnham: 2014) 215–222) and the fact that the year 1564 marked their definitive fallout (see Barocchi, "Una 'Selva di notizie'", 87–88). The Vulcan-as-Vasari reading was proposed by Sabine Feser (Feser, "Geschmiedete Kunst", 56). This *ogni dipintore dipinge se* hypothesis is tempting, were it not for the anticipatory ageing Vasari would have applied to himself—compare the white hair and beard of Vulcan to the still brown hair of Vasari in his half-length portrait (c. 1570) in the Uffizi or his likeness in the Pala Albergotti for example.

- 88 It may be compared to the image of a sculptor at work wearing only a loincloth, with a chisel in his left hand and a raised hammer in the right hand, which was used as a portrait of Michelangelo in Sigismondo Fanti's *Triumpho di Fortuna* (Venice, Giacomo Giunta: 1527). On this stock image being a portrait of Michelangelo, see Johnson G., "Michelangelo, Fortunetelling and the Formation of Artistic Canons in Fanti's *Triumpho di Fortuna*", in Jones L.R. – Matthew L.C. (eds.), *Coming About: a Festschrift for John Shearman* (Cambridge, Mass.: 2001) 199–205.
- 89 Michelangelo passed away on 18 February 1564, and his body arrived in Florence on 10 March. On his funeral, see Petrioli Tofani A., "L'apparato per le esequie di Michelangelo", in Meijer B.W. – Zangheri L. (eds.), *Accademia delle Arti del Disegno: studi, fonti e interpretazioni di 450 anni di storia* (Florence: 2015) 457–471; Ruffini, *Art without an Author* 11–38; Wittkower R. – Wittkower M., *The Divine Michelangelo: the Florentine Academy's Homage on his Death in 1564* (London: 1964).
- 90 According to Leatrice Mendelsohn 'it is likely that [Varchi] too was responsible for some aspects of the program' (Mendelsohn, *Paragoni* 80). Varchi delivered the main funeral oration.
- 91 See Wittkower – Wittkower, *The Divine Michelangelo* 96–97. For the Vulcan statue, see p. 114 and p. 158. On the destiny of these statues, see Wązbiński Z., "La prima mostra

not represented by way of the traits of Minerva, but figured by a slender youth ‘tutto spirito e di bellissima vivacità [all animation and beautiful liveliness]’.<sup>92</sup> Although infinitely more complex than the *Forge of Vulcan* from an iconographical point of view, the artworks realised for Michelangelo’s funerals also illuminate the small copper painting: they constitute the first collective work by the Accademia del Disegno, and were intended as a gift honouring Michelangelo’s exceptional talent, not unlike the drawing carried by Minerva which, conceived by an academy of draughtsmen, is being presented to Vulcan. It seems likely, then, that the *Forge of Vulcan* was painted in Michelangelo’s memory. In any case, it is striking that the commemoration of Michelangelo’s talent coincides with new proposals for the allegorical depiction of *ingegno*. Varchi’s theories of creativity certainly played a role in this dynamic. At this stage, through the use of personification, *ingegno* was on the verge of being equated with the greatness of an individual *per se*—adumbrating the later qualification of a great artist as a ‘genius’. The early cult of Michelangelo foreshadowed this etymology.

### Conclusion

One can hardly overemphasise the legitimacy of Édouard Pommier’s caution in translating the word *ingegno*. In the parlance of sixteenth-century writers on art in the *volgare*, the word was still ubiquitous, and remarkably fluid. What this essay shows, however, is that *ingegno* was also framed in theoretical terms. Varchi’s discussion of *ingegno* and *fatica* in the *Due lezioni* serves as an important landmark, as it inscribes the term within a broader theory of artistic creativity. This discussion maintained a key aspect of the humanistic heritage of *ingegno*: its pairing with a complementary notion. The counterpart of *ingegno* initially chosen by Varchi was not *arte* or *industria*, but *fatica*—a loaded term in that intellectual environment. The importance of Varchi’s discussion with and lectures to the artists and critics of his day suggests that his *ingegno/fatica*

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dell’Accademia del Disegno a Firenze”, *Prospettiva* 14 (1978) 47–57, 51.

92 Wittkower – Wittkower, *The Divine Michelangelo* 96–97. The boy is said to have ‘two small wings at his temples such as one sometimes sees in representations of Mercury’. This choice, instead of Minerva, is perhaps due to the fact that Minerva was already employed on the other side of the catafalque to stand for Art. However it should be noted that, according to an earlier sketch for the catafalque now in the Ambrosiana, *Ingegno* was placed where Minerva originally stood (namely in the right hand side while facing the monument). See Wittkower – Wittkower, *The Divine Michelangelo* fig. 8, to be compared with the Wittkowers’ reconstruction p. 148.

dichotomy may have lived on in a number of ways, and most eloquently in allegorical depictions such as Vasari's *Forge of Vulcan*, where *ingegno* presents a *disegno* to the artist's bodily eyes while presiding over a parable of Platonic contemplation. The painting captures Vasari's reception of and reaction to conceptions of creativity promulgated by Varchi at the time of the foundation of the Accademia del Disegno, and expresses his own vision of the academic culture peculiar to visual artists: one where both *ingegno* and *fatica* are needed equally, and where, as Vasari would recount in his *Vite*, no Minerva emerges from Jove's brain without the hammer of Vulcan.

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## Bernardino Telesio on Spirit, Sense, and Imagination

*Leen Spruit*

Bernardino Telesio (Cosenza, 1509–Cosenza, 1588) is routinely described by early modern historiographers as the first *novator*, the first philosopher to break from Aristotle and propose his own doctrine. The proem of Telesio's *De rerum natura iuxta propria principia* (the final edition of which appeared in nine books in 1586) explicitly presents the work as a manifesto against Peripatetic rationalism: 'the structure of the world and the nature and magnitude of bodies contained in it are not to be sought from reason, as the ancients did; they must be perceived from sensation and treated as being things themselves'.<sup>1</sup> True to this principle, Telesio laid down the foundation of his naturalism in the first two books before attacking Aristotle in the third; the other books are devoted to physical, biological, psychological, and moral considerations. His attack on Aristotle did not spare the latter's psychology. Indeed, Telesio attempted to replace Aristotle's hylemorphism as well as his faculty psychology with his own, new theory.

This essay examines Telesio's new model and assesses the role of the imagination in it. In opposition to Aristotelian natural philosophy, Telesio held that all natural beings are comprised of matter and two active principles. The active principles are heat, which expands, and cold, which contracts.<sup>2</sup> Expansion

1 Of the *De rerum natura iuxta propria principia* I have used the edition by De Franco L., vol. I (books I–III) and vol. II (books IV–VI) (Cosenza: 1965–1974), and vol. III (books VII–IX), (Florence: 1976). For the quoted text, see vol. I, 26.

2 Telesio was educated in Milan by his uncle Antonio, and afterwards in Rome and Padua. His studies included classics, science and philosophy. In 1553 he married and settled in Cosenza, becoming the founder of the Cosentian Academy. For a time he lived in the household of Alfonso III Carafa, Duke of Nocera. 1565 saw the publication of the first edition of his major work *De rerum natura iuxta propria principia*; this was followed by a number of scientific and philosophical works, published after his death in *Varii de naturalibus rebus libelli* (1590). His heterodox views drew the attention of the ecclesiastical bodies of doctrinal control, and in the 1590s his books were placed on the Index. For further biographical information, see Fiorentino F., *Bernardino Telesio, ossia Studi storici su l'idea della natura nel Risorgimento Italiano*, vol. I (Florence: 1872).

and contraction account for generation and corruption, and thus for all the diverse forms and types of existence, while the bodily mass on which such forces operate remains the same. Nature is endowed with an internal principle of motion, by the heat that pervades the entire cosmos as *spiritus*. The *spiritus* (a fiery substance) is also the principle of sensitivity, so that all beings feel: the difference between organic and inorganic beings is not essential, but merely one of degree.

In a series of sharp polemics with Aristotle, and even more incisive disagreements with followers of Aristotle, Telesio developed a system of ideas that was clearly influenced by the naturalistic aspects of Peripatetic philosophy, albeit marked by a stronger materialistic tendency and derived at least in part from Stoicism and Galenic medicine.<sup>3</sup> Telesio's psychological and epistemological speculations were fuelled by the conviction that the traditional schemes of Aristotelian philosophy could not accommodate recent findings of anatomy and physiology. For this reason, he sought to construct a more suitable alternative to Peripatetic philosophy and science. Such an alternative project could only succeed, he claimed, if nature were investigated on the basis of principles demonstrably present in the things themselves. For this reason, natural reality had to be approached by means of those cognitive faculties most appropriate to it—namely, the senses. The premise of Telesio's psychology of cognition was therefore the absolute primacy of sensation, while all other types of cognition were ultimately seen to depend on direct perception.

Telesio ascribed psychological functions to a hot, bodily entity, which he identified with the *spiritus*. *Spiritus* (spirit) is common to man and animals. An imperceptibly thin and fiery body, it constitutes our sensible soul.<sup>4</sup> However,

3 In particular, the doctrine of *pneuma*. However, see also Marsilio Ficino, Cornelius Agrippa, Girolamo Cardano, and Giordano Bruno, for the Neoplatonic and Hermetic doctrine of *spiritus* as vehicle of the human soul. For discussion, see Klein R., "L'imagination come vêtement de l'âme chez Marsile Ficin et Giordano Bruno", *Revue de métaphysique et de morale*, 51 (1956) 18–38.

4 See Telesio, *De rerum natura* vol. 111/7, chapter 4, 12f. See also Telesio, *De rerum natura* vol. 11/5, chapter 3, 216: the spirit as bearer of sensibility and movement; *De rerum natura* vol. 11/5, chapter 10, 260: spirit as 'anima sentiens'; Telesio, *De rerum natura* vol. 11/5, chapter 5, 226: the spirit is present principally in the nervous system, and in particular in the brain, in order to guarantee the unity of the perception. Cf. Telesio, *De rerum natura* vol. 11/5, chapter 12, 274–276, and also below. Telesio's view of spirit was clearly inspired by Epicurean and Stoic ideas. See, among others, Epicurus, *Letter to Herodotus*, 63–67: "The next thing to see—referring to the sensations and feelings, since that will provide the strongest confirmation—is that the soul is a fine-structured body diffused through the whole aggregate, most strongly resembling wind with a certain blending of heat [...] All this is shown by the soul's powers,

while all natural beings are endowed with spirit, man also has a rational soul directly created by God. The existence of man's rational soul obviously raises the issue of the limits to Telesio's materialism; and his notion that a corporeal spirit is the basis of all cognitive activities necessarily involved a reassessment of the status and role of the inner senses. Telesio regarded sense perception as superior to all subsequent cognitive functions, including imagination and intellectual knowledge, and therefore rejected the traditional distinctions between the psychological faculties, which were said to succeed each other beginning in the external senses and continuing through the inner senses up to reason and intellect. Moreover, he dispensed with mediating mental representations.

### Sense and Reason

At the basis of Telesio's philosophy and psychology lies the absolute primacy of sensation and observation; all other forms of cognition ultimately depend on direct perception. To be sure, Telesio did not belittle the role of reason as such, but he declined to appeal to reason wherever more direct evidence could be had from the senses. He argued that rational knowledge always depends on a previous sensation. In his eyes, intellectual knowledge of the material world

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feelings, mobilities and thought processes, and by those features of it whose loss marks our death. [...] Consequently those who say that the soul is incorporeal are talking nonsense. For if it were like that it would be unable to act or be acted upon in any way, whereas as a matter of fact both these accidental properties are self-evidently discriminable in the soul'; cf. Lucretius, *De rerum natura* vol. III, 136–176. Epicurus' word for 'wind' (*pneuma*) is also the term used by the Stoics for the warm 'breath' which they believed was the stuff of the soul. Heat or fire was a fundamental concept in Presocratic thought, and its influence persisted in later times. Aristotle regarded heat as the cause of growth which is present in every seed, and inclined to the view that either breath or heat is the immediate bodily vehicle of the soul. The early Stoics extended this biological notion to explain movement and change in the whole universe. Nature is an artistic or creative fire; and its essence is expressed in the sentence: 'God is the seminal *logos* of the universe' (Diogenes Laertius, *Lives of Eminent Philosophers* VII.136). Heat and fire never lose this pre-eminence in Stoicism. From Chrysippus onwards the Stoics identified *logos* not with pure fire, but with a compound of fire and air, *pneuma*. This modification was almost certainly prompted by contemporary physiology: *pneuma* was regarded by medical writers as the 'vital' spirit in the arteries. Chrysippus made the *pneuma* the vehicle of *logos*. *Pneuma* is a dynamic entity, something more like 'force' or 'energy'. It interacts with matter; it remains obscure how. Chrysippus speaks about *pneuma* permeating matter. But two bodies cannot occupy the same space at the same time. Lucretius regarded the soul as a mixture of fire, breath, air, and an unnamed element; see *De rerum natura* 262–322.

was a mere substitute for actual sensation and was therefore inferior to direct sense perception.<sup>5</sup>

What are the consequences of Telesio's conception of the senses, taken together, as the principal criterion for our knowledge of reality? Clearly, this criterion imposes strict limits on our (philosophical) knowledge of the world: we can know only what we perceive, and we can perceive only what we can experience.<sup>6</sup> Thus, or so it would seem, the bounds of knowledge coincide with the bounds of the body. Indeed, Telesio rejected the arbitrary imposition of abstract, rational schemata on concrete physical processes, claiming that the latter should be investigated 'iuxta propria principia'.<sup>7</sup> In particular, Telesio scolded Aristotle and his followers for approaching nature with an inappropriate instrument—namely, reason. According to him, their absolute faith in reason leads to 'arbitrarily creating a fictitious world'.<sup>8</sup>

Telesio's emphasis on the bodily bounds of knowledge did not imply skepticism with regard to the external world.<sup>9</sup> He assigned to the senses the

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- 5 Telesio, *De rerum natura* vol. 111/8, chapter 14, 228: the knowledge of partly unknown things is based on the senses, and therefore also the improvement and perfection of this knowledge. See also *Solutiones obiectionum Francisci Patritii*, in Telesio Bernardino, *Varii de naturalibus rebus libelli*, ed. De Franco L. (Florence: 1980) 453: 'Rationem, id est rerum cognitionem, quam non sensus, sed rerum sensu perceptarum similitudo nobis praebebat, haudquaquam despicio, nec despiciendum dixerim unquam, quin et aequae propemodum ac sensui ipsi fidem habendam suo loco decerno'.
  - 6 Telesio, *De rerum natura* vol. 11/5, chapter 7, 246: 'Quoniam enim quae rerum vires nihil in nos agunt nihilque nos immutant, qualesvis eae sint, nullum sui sensum nobis faciunt, sed eae modo nobis percipiuntur, a quibus patimur et a quibus immutatur, itaque antiquioribus omnibus, et ipsi in primis Aristoteli, sensus quivis per alterationem et passionem quandam fieri videtur'.
  - 7 See also Ingegno A., "The New Philosophy of Nature", in Schmitt Ch. B. et al. (eds.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988) 236–263, here 251–252.
  - 8 Telesio, *De rerum natura* vol. 1, proemium, 26; Telesio, *De rerum natura* vol. 111/7, chapter 13, 48–50, where Telesio accused Aristotle of competing with God; cf. also Telesio, *De rerum natura* vol. 111/8, chapter 26, 290, regarding the traditional philosophy that is merely built on 'decreta hominis'. For discussion, see also Vasoli C., "Riflessioni su Bernardino Telesio", in *Atti del Convegno Internazionale di Studi su Bernardino Telesio*, Cosenza 12–13 maggio 1989 (Cosenza: 1990) 15–30, here 24.
  - 9 As for example in the Cyrenaics and Sceptics. According to the Cyrenaic school, founded in the fourth century BC by Aristippus, only one's own affections can be apprehended; cf. Sextus Empiricus, *Adv. Math.* vol. VII, 191f. Subsequently, the Sceptics casted doubt on the senses' capacity to inform us about external objects.

extraordinarily powerful cognitive function of detecting the very *nature* of things.<sup>10</sup> By the same token, as regards psychology, Telesio believed that a detailed empirical study of animals and men could help ascertain the precise nature of the soul.<sup>11</sup> He admitted that perception of a physical object involves a causal relation. The objects of perception may owe some of their properties to the conditions of perception, such as the disposition of the body and that of the spirit at a given moment.<sup>12</sup> Still, however complicated the causal path from object to percept may be, what we experience are veritable items in our physical environment and not surrogate images or intermediaries.

In this sense, then, Telesio was plainly a realist. Sensory affections form the basis of cognition, although they are not the outermost limit of cognitive processing, as our cognitive power can reach all the way to the objects themselves.<sup>13</sup> Telesio warned, however, that things do not causally act as undifferentiated wholes. Moreover, many things are perceived only partially. Any incomplete cognition may be completed by comparing a partial perception with previous perceptions. In fact, intellectual thought and discursive reasoning can inform the sensible soul about things that are distant, absent, or partly unknown.

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10 Cf., for example, Telesio, *De rerum natura* vol. III/7, chapter 10, 36; see also section 3, below.

11 Telesio, *De rerum natura* vol. II/5, chapter 7, 244.

12 The seed-soul, although different from the body, is affected according to the nature and disposition of the body; see Telesio, *De rerum natura* vol. II/5, chapter 35, 416. Cf. the position later developed by Spinoza in *Ethica* II, prop. 16: the idea of any mode in which the human body is affected by external bodies must involve the nature of the human body and at the same time the nature of the external body.

13 This is an important difference with later materialist psychologists. According to Hobbes, the senses do not give us access to the essences of the things; cf. Hobbes Thomas *The English Works*, 11 vols., and *Opera philosophica quae latine scripsit omnia*, 5 vols., ed. Molesworth W. (London: Gassendi believed that cognition consists of the mental reconstruction of sensible reality on the basis of species, which are the material effects of bodies. Species are not metaphysically connected with the substantial essence of these bodies, however. Therefore, the human soul has only indirect access to the world, and it can never achieve true and justified beliefs about the substantial nature of reality. See *Objectiones quintae ad Cartesii Meditationes*, in Descartes René, *Oeuvres*, eds. Adam Ch. and Tannery P., 12 vols. (Paris: 1982–1987) vol. VII, 271 and 285; Gassendi Petrus, *Opera*, 6 vols. (Lyon: 1658) vol. I, 443A: there is no privileged metaphysical link between material reality and the percipient, nor a substantive connection between things and ideas; see also Gassendi, *Opera*, vol. III, 182–185, 203A; vol. V, 148, and vol. VI, 34.

Throughout his *De rerum natura*, Telesio fiercely attacked the philosophy of Aristotle. He agreed with the Stagirite on at least one essential point of methodology, however: differences and similarities in nature must be established on the basis of the actual behaviour of natural organisms.<sup>14</sup> All knowledge is based on observation and on inferences from observation.<sup>15</sup> According to Telesio, only a restricted set of sensible features can be perceived directly—namely, the immediate effects of heat and cold, which are the ‘forces of acting natures’ (*agentium naturarum vires*).<sup>16</sup> Therefore, rational inferences, although cognitively inferior and not always reliable, must necessarily play an essential role in the overall structure of Telesio’s philosophy. For example, matter cannot be perceived; its existence is inferred.<sup>17</sup> Also the existence of the spirit, the very foundation of Telesian psychology, is impossible to prove directly by the senses, but must be inferred from observed behaviour. We are not able to detect the spirit in the nervous system. Yet, it is necessary to postulate the existence of an ethereal and fiery substance in order to explain the phenomena of perception.<sup>18</sup>

### Spirit, Divine Soul, Materialism

Telesio ascribed psychological functions to a bodily entity, the spirit, which is the substance of the organic soul and not its instrument, as Ficino and other Neoplatonists have thought.<sup>19</sup> The spirit, which Telesio also described

14 See Telesio, *De rerum natura* vol. 1/2, chapter 4, 250.

15 Telesio, *De rerum natura* vol. 111/7, chapter 32, 134.

16 Telesio, *De rerum natura* vol. 111/7, chapter 9, 36. Recall that heat and cold are active and incorporeal natures; they do not subsist in themselves, but always need some matter in which to reside.

17 Cf. Telesio, *De rerum natura* vol. 1/1, chapter 4, 60, and 1/3, chapter 10, 442. This view apparently derives from Aristotle; cf. *Metaphysics* 1036a8, and *On generation and corruption* 332a5; see Schuhmann K., “Telesio’s Concept of Matter”, in *Atti del Convegno Internazionale di Studi su Bernardino Telesio, Cosenza 12–13 maggio 1989* (Cosenza: 1990) 115–134, here 121.

18 Telesio, *De rerum natura* vol. 11/5, chapter 10, 264–266. This is in substantial conformity with many modern accounts of philosophy of mind: mind is an entity that is not perceptible, but the existence of which is accepted in order to explain certain phenomena. The paucity of his ontological entities, and the seemingly circular way in which he attributes functions to the spirit will be further analyzed in section 3.

19 Like the later Neoplatonics, Ficino regarded the *spiritus* as a subtle material substance between soul and body, which precludes *de facto* all immediate contact between body and soul. It may therefore serve, in principle, to filter out the ‘negative influence’ of the

as 'seed-soul', is distinguished from the immaterial, rational soul, which is a divine creature added to spirit as its form.<sup>20</sup> This divine soul cannot operate without the sensible soul, however, and its contribution to knowledge of natural reality, though valuable, is essentially inferior to that of sense perception.<sup>21</sup> The introduction of the divine soul is an integral part of Telesio's methodology, because according to his account certain psychological functions and acts of man cannot be explained without postulating an immaterial mind. Man aspires not only to sensible and thus perishable things, but also to divine and immortal things, which belong to his eternal afterlife.<sup>22</sup> I shall, however, not pursue this line of Telesio's thought any further here, but focus instead on his specific brand of psychological materialism.

At the outset of Book v, Telesio addresses the question of whether the soul is the form of the body, or whether it is a 'separate substance' ('*substantia separata*').<sup>23</sup> In his ongoing polemic with Aristotelian psychology, he argues that the seed-soul is not the form of the body, but an entity of its own. It is the divine soul, which is superadded to the seed-soul, which should be seen as the form of the body.<sup>24</sup> Telesio established the relation between spirit and body by inference from observed phenomena (the sensorimotor behaviour of animate beings). Since we have no direct knowledge of the presence of the spirit in the body, we must base our knowledge of their mutual relation on inference from observable passions and actions. If the spirit were the form of the body, body and spirit would form one substance. No animal, however, can be seen as 'one and the same being' ('*unum idemque ens*'). Each animal has parts that differ by nature and in their '*facultas agendi, patiendique et operandi*'.<sup>25</sup> From the 'affections of the soul' ('*affectiones animae*') we may conclude that the seed-soul

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body on the soul; cf. *Theologia platonica* IX.5, in Ficino Marsilio, *Opera omnia*, 2 vols. (Basel: 1576; reprint, Turin: 1983), 212; see also *ibid.* VII.6, 178; *idem*, *De vita*, in *Opera* 531; *In Convivium* VI.6, in *Opera* 1343–1344.

20 See, for example Telesio, *De rerum natura* vol. II/5, 34–37, 404f. See Telesio, *De rerum natura* vol. II/5, chapter 3, 214–220, for the unity of the seed-soul and the divine soul.

21 Telesio, *De rerum natura* vol. III/8, chapter 3, 172, and chapter 11–12, 208–220.

22 See Telesio, *De rerum natura* vol. II/5, chapter 2, 210; vol. III/8, chapter 15, 232–236.

23 Telesio, *De rerum natura* vol. II/5, chapter 1, 208.

24 Telesio, *De rerum natura* vol. III/8, chapter 15, 232f. The divine soul is seen as '*forma spiritus*' in vol. II/5, chapter 50, 446–48, vol. III/8, chapter 9, 190 and vol. III/8, chapter 15, 232. If Aristotle had defined the divine soul as the form of the body, Telesio would have agreed with him; cf. vol. II/5, chapter 40, 446–48. For discussion, see Spruit L., "Elementi aristotelici e polemica anti-peripatetica nella dottrina dell'anima divina di Telesio", *Verifiche*, 21 (1992) 351–370.

25 Telesio, *De rerum natura* vol. II/5, chapter 4, 222.



is different from the body, yet corporeal.<sup>26</sup> Telesio's methodology leads him to a distinction between soul and body that is both functional and ontological in character.<sup>27</sup> The subtle spirit dwells in the body, but it is neither the form nor a part of the body.<sup>28</sup> The presence of empty cavities and conducts in the body—the cerebral cavities and the spine—is another indication for the existence of a material, yet distinct and imperceptible spirit. All animals, including human beings, are composite entities. However, they are not composed of soul and body in the Aristotelian sense of form and matter, but of spirit and body.<sup>29</sup> All activities of the spirit are governed by self-preservation, which is already at work in sensation. For its own benefit, the spirit must be aware of pleasant or unpleasant things in its environment. Sensation occurs when external things affect the spirit (alternately by dilation and contraction). Pushed to its own operation (motion) in sensation, the spirit enjoys wellbeing.<sup>30</sup>

Rejecting traditional dualist psychologies, Telesio replaced them with a more subtle distinction between soul and body. The spirit is a material entity with specifically corporeal characteristics: it is the most powerful combination of heat and matter. These characteristics allow it to perform the traditional 'mental' activities. Sensation, emotion, and intelligence are functions of bodily capacities.<sup>31</sup> Telesio's theory is actually a sort of inverted Platonism, in which the soul is a separate entity that uses the body as its organ.<sup>32</sup> Yet, the soul is as material as the body itself, and therefore is not separate from the latter, unlike the Peripatetic or Platonic intellect.<sup>33</sup>

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26 Telesio, *De rerum natura* vol. II/5, chapter 31.

27 Telesio's approach was evidently inspired by Aristotle's *De anima* 403a12–13: 'If then any function or affection of the soul is peculiar to it, it can be separated from the body; but if there is nothing peculiar to the soul, it cannot be separated'.

28 See also Telesio, *De rerum natura* vol. II/5, chapter 34, 404f.

29 Telesio, *De rerum natura* vol. II/5, chapter 5, 226–236. A physiological argument for the thesis that spirit makes up the substance of the soul is developed in vol. II/5, chapter 28, 366f, where Telesio discussed the sudden death caused by the presence of air in the brains.

30 Telesio, *De rerum natura* vol. II/5, chapter 9, 254–258. See also vol. III/7, chapter 4–5, 14–18; vol. III/7, chapter 3, 8f; and vol. III/8, chapter 21, 268.

31 See Telesio, *De rerum natura* vol. II/5, chapter 31–32, 384–392: emotions show that the soul is bodily.

32 See Telesio, *De rerum natura* vol. II/5, chapter 41, 452.

33 Telesio, *De rerum natura* vol. II/5, chapter 29, 376. See Copenhaver B., "Astrology and Magic", in Schmitt C.B. et al. (eds.), *Cambridge History of Renaissance Philosophy* (Cambridge – New York – New Rochelle et al.: 1988) cit. 264–300, here 292.

How should we characterise Telesio's version of materialism? He reduces soul to matter and analyses psychological phenomena as functions of a bodily entity, the spirit. This view may be described as essentially 'anti-chauvinist' in the following sense. For Telesio, human beings, like all other animals, are biological systems with a specific organisation: they are governed by a substance whose expansion and contraction lies at the basis of their vegetative, sensitive, and intellectual lives. In fact, Telesio believed that all animals endowed with spirit possess the capacity for perception, thought, and discursive reasoning, by virtue of their specific bodily characteristics—that is, by being constituted of hot and extremely mobile matter.<sup>34</sup> This means that in all mental activities that do not specifically involve the divine soul, there is no essential difference between man and animal. The difference between them is one of degree: the human spirit is more 'pure' and is located in a place that is well protected and better suited to absorbing and selecting the stimuli from the environment, and to recalling them.<sup>35</sup>

The Telesian spirit plays approximately the role that is now commonly ascribed to the brain and to the nervous system. Substituting brain for spirit, Telesio's psychology may be seen as an early anticipation of the materialism that underlies much of modern neuroscience and cognitive science. For Telesio, every living being has a specific and particular physiological organ, the structure of which predisposes it to certain mental (perceptual, emotional, cognitive) activities. Psychological processes emerge from the activity of this organ (spirit or brain). They must be understood in terms of the distinctive features of the various portions (central and peripheral) of the nervous system, and of the latter's nature and precise structural properties (plasticity, temperature, tenuousness, perspicuity, etc.).<sup>36</sup> We may therefore say that Telesio's psychology postulates a complex organism, the operation of which can be explained in terms of an interaction between peripheral processors and a central

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34 See Telesio, *De rerum natura* vol. 111/8, in particular, chapter 10 and following. Knowledge does not emerge with the evolution of verbally competent animals. For a similar position in ancient philosophy, cf. Sorabji R., "Perceptual content in the Stoics", *Phronesis*, 35 (1990) 307–314.

35 See Telesio, *De rerum natura* vol. 111/8, chapter 15, 232. Also the differences in intelligence between different men have a purely physiological basis; cf. vol. 111/8, chapter 29, 298, and chaps. 30–33.

36 See also Telesio, *De rerum natura* vol. 111/8, 298–328, for the influences of the climate on the functioning of the spirit.

processor; the latter's operation, in its turn, is to be explained in terms of physiology (warm, cold, contraction, dilation).<sup>37</sup>

Telesio believed that psychological states are strictly related to properties of the spirit (with the exception of states linked to specific objects such as God and the 'divine entities' ['*entia divina*'], the perception of which requires the cooperation of the divine soul).<sup>38</sup> We may, in a sense, view him as a forerunner of modern reductionist strategies that treat mental states as conditions of the central nervous system. Still, Telesio's materialism is certainly not eliminative in the contemporary sense of the word; unlike so-called eliminative materialists, he did not regard the traditional psychological terminology as meaningless or devoid of reference, nor did he challenge the existence of psychological functions and mental phenomena.<sup>39</sup> Furthermore, he did not think of perception and thought as mere epiphenomena supervening upon more fundamental structural features of the spirit. Rather, his psychology aimed at individuating the precise physiological basis of mental events, without eliminating them or relegating them to some second-order existence.

Telesio's naturalism is both weaker and methodologically less restrictive than modern versions of physicalism.<sup>40</sup> Although his view implies *prima facie* an identity theory of mind, it does not treat mental states as being susceptible to a straightforward analysis in physical terms. Although mental states are properties of the corporeal mind, they are not merely among its physical states. Rather, Telesio's *De rerum natura* suggests that matter in certain complex states generates acts that cannot be analysed in purely physiological terms. It describes the complex interaction between central spirit and peripheral parts in *psychological* terms: the portions of the spirit move '*iuxta universitatis decreta*' (according to the laws of the totality).<sup>41</sup> At the same time, however, Telesio found himself unable to explain how exactly mental

37 As we shall see below, however, Telesio did not remain faithful to this methodology of analysis.

38 See Telesio, *De rerum natura* vol. II/5, chapter 2, 210–214; cf. vol. III/8, chapter 15, 232–236, vol. III/8, chapter 6, 184 and vol. III/8, chapter 8, 190.

39 Unlike, for example, Churchland P., "Eliminative Materialism and the Propositional Attitudes", in Lycan W.G. (ed.), *Mind and Cognition. A Reader*, (Cambridge, MA – Oxford: 1990) 206–223.

40 In this sense, his position is similar to that of the ancient physicalists. To deny physicalism, for Epicurus and for the Stoics, was tantamount to denying that the soul can be studied scientifically. Ancient versions of physicalism are distinct from reductionism, however, since natural science is not assumed to lead us to deny or reinterpret familiar facts about ourselves, nor to try to reduce them to other kinds of facts.

41 Cf. Telesio, *De rerum natura* vol. II/5, chapter 14, 292–298.

causation worked.<sup>42</sup> Finally, as we shall see below in more detail, Telesio did not couch the specific laws that govern complex mental acts, such as imagination, memory and intellection, in physiological terms.<sup>43</sup>

### Perception, Imagination, and Cognition as Enactment

We have now seen that for Telesio, all mental events are natural acts attributed to hot matter and grounded in the spirit's primitive capacity to react to external stimuli. All mental phenomena thus arise from the 'sensibility' of the spirit. This sensibility concerns all types of internal and external stimuli. In Telesio's psychology of perception, the distinction between central and peripheral spirit plays a crucial role. Furthermore, his explanation of how the spirit 'feels' hinges on two central claims: (1) The spirit feels because it is moved by the affections of the body.<sup>44</sup> (2) Nonetheless, in perception and other mental acts, the spirit is *active*.<sup>45</sup>

Although present in the whole body, the spirit has its principal seat in the brain.<sup>46</sup> The 'central portion' of the spirit coordinates those parts of the spirit that find themselves in the peripheral areas of the body, which communicate directly with the surrounding world. The existence of a central portion of spirit allows for the perception of differences and for memory, imagination, and intellection.<sup>47</sup> Although Telesio held that there is one soul in each animal and in each man, which accounts for perception, motion, and thought, he

42 Telesio, *De rerum natura* vol. II/5, chapter 14, 298–300: 'At qui illud fiat, qui scilicet universitas, in cerebri ventriculis residens, portionibus, manibus laringique et reliquis inconsistentibus corporis partibus modum rationemque, qua motus immutandi assidue sunt, indat, longe obscurissimum est'.

43 Telesio, *De rerum natura* vol. II/5, chapter 14, 296–298: in all its activities the central part is prompted by the desire of self-preservation.

44 Telesio, *De rerum natura* vol. III/7, chapter 2, 4: 'Utique manifestum est propterea rerum vires actionesque et aëri impulsiones spiritum sentire, quod ipse ab iis patiat immuteturque et commoveatur spiritus'.

45 Telesio, *De rerum natura* vol. III/7, chapter 2, 4 and vol. III/7, chapter 6, 28. See Giglioni G., "The First of the Moderns or the Last of the Ancients? Bernardino Telesio on Nature and Sentience", *Bruniana & Campanelliana*, 16 (2010) 69–87, who extensively discusses the ability of the spirit to feel and react to all phenomena occurring in the universe.

46 See Telesio, *De rerum natura* vol. II/5, chapter 11, 270; cf. chapter 27, 364, I, 21–23.

47 Telesio, *De rerum natura* vol. II/5, chapter 12, 274–278. See also vol. II/5, chapter 27, 360–364: animals are governed like cities. Cf. vol. II/5, chapter 34, 406: animals are like ships, with different parts, a number of sailors, a captain, etc.

drew a physiologically grounded distinction between various psychological competences.<sup>48</sup> Notice, however, that Telesio did not introduce different kinds of psychological *mechanisms* for the operations of sense, imagination, and reason. To the contrary, as we shall see below, he rejected any principled distinction between perception, imagination, and cognition.<sup>49</sup>

How does the cooperation between central and peripheral parts of the spirit work? The spirit present in the peripheral regions depends on the commands of the central part and participates in its capacities.<sup>50</sup> The peripheral spirit is responsible for capturing external stimuli. The central part, which remains well protected inside the brain, is not moved by external affections; unlike the peripheral spirit, it is not vexed by its own passions.<sup>51</sup> It is therefore able to experience the operations and passions of the peripheral parts, which it elaborates, organises, and preserves. Put differently, the lower-level neuro-anatomy monitors the external stimuli that impinge on the sense organs. The 'central' spirit stores these affections, thus laying the basis for imagination, memory, and intellection.<sup>52</sup> This view of the soul as a centralised system, which is causally responsible for how a human being acts and functions, is typically Stoic.<sup>53</sup>

At first sight, Telesio's account of sensation may seem purely circular. His explanation of the relation between external stimuli and mental responses and subsequent states has a distinctly psychologistic flavour. Perception involves objects that move the spirit, yet the resulting movement of the spirit is not delineated as a *passio* caused by these objects. Rather, sense perception is described as 'the perception of the affection, changes and motions' ('perceptio passionum, immutationum, motionum').<sup>54</sup> In sum, then, it would seem that

48 Telesio, *De rerum natura* vol. 11/5, chapter 13, 286–290; see also *Quod animal universum ab unica animae substantia gubernatur. Contra Galenum*, in Telesio Bernardino, *Varii de naturalibus rebus libelli*.

49 Translating his position in modern terms, Telesio did not subscribe to the modularity of mind, in the sense now argued for by Fodor J.A., *A Theory of Content and Other Essays* (Cambridge – Massachusetts: 1990) ch. 9.

50 Telesio, *De rerum natura* vol. 11/5, chapter 14, 292–302; cf. vol. 11/5, chapter 12, 274.

51 Cf. also Telesio, *De rerum natura* vol. 11/5, chapter 12, 278–280.

52 Cf. Telesio, *De rerum natura* vol. 111/8, chapter 28, 294–296; see also below.

53 The Stoics claimed that bodily affections occur in the affected regions, but sensations in the commanding faculty. This is the soul's highest part, which produces impressions, assents, perceptions and impulses. See Aetius, *De placitis philosophorum* 4.21.1–4, and 4.23.1; Calcidius, *Commentarius* cap. 220; Plotinus, *Enneads* IV.7.7. However, the Stoics located this commanding-faculty in the region of the heart.

54 Telesio, *De rerum natura* vol. 111/7, chapter 2, 6.

perception consists in the perception of perceptions: 'ubi spiritus patitur, pati se sentit' ('Where the spirit is affected, there it senses that it is affected').<sup>55</sup>

Two caveats are in order here. In the first place, according to Telesio, the exact way in which sensation works is experientially inaccessible to us. Brain and nervous system are both defined as the 'medium in which feeling takes place' ('medium in quo sentitur'). We know that the soul feels in the brain, but the brain does not give to the soul a direct sensation of its own passions, which means that the processes that determine thought and perception are not accessible to introspection.<sup>56</sup> In the second place, in his account of sensation, Telesio draws a crucial distinction between an alteration of the spirit, which is an affection caused by an external cause, and the spirit's motion, which depends on the spirit's own substance and which is functional in preserving the spirit's own nature.<sup>57</sup>

Perception consists in the interplay between spirit and external stimuli: it is the result of the impact of external objects touching the spirit in those extreme parts of the body that have traditionally been identified with the sense organs. Given that they are based on a real tactile *passio*, all senses (with the exception of hearing) can be reduced to touch, which therefore has primacy over the other senses.<sup>58</sup> This view excludes the Aristotelian notion that the soul is actualised by external forms.<sup>59</sup> It also means that sensation is essentially an operation of the spirit.<sup>60</sup>

At this point in Telesio's explanation, however, it is impossible to distinguish the process from the product. Perception is neither a direct acquisition nor a gradual assumption of forms, but rather a sensory-motor enactment. In other words, in perception the spirit is primarily and essentially open to its environment, and its integration and involvement in its environment is meaningful,

55 Telesio, *De rerum natura* vol. 111/7, chapter 20, 34.

56 See *De rerum natura*, vol. 11/5, chapter 10, 266: '[...] sed cerebrum ipsum [...] nullum propriae passionis sentienti animae sensum praebet'. John Locke was later to endorse a similar position. According to Locke, we are not aware of the sensory impulses that hit us, but only of what is generated within our minds. There is certainly a transition from nerve impulse to mental content, but Locke had very little to say about the mechanism that accomplishes this, since that mechanism as such is experientially inaccessible to us. See Locke John, *An Essay Concerning Human Understanding*, ed. Nidditch P.H. (Oxford: 1975) 11.xxiii.28; 1V.iii.12–14 and 28.

57 Telesio, *De rerum natura* vol. 11/5, chapter 17, 310–312.

58 Telesio, *De rerum natura* vol. 111/7, chapter 8, 30. See, in general, vol. 111/7, chapter 8–33. For discussion, see Fiorentino, *Bernardino Telesio*, I, 290–291.

59 Telesio, *De rerum natura* vol. 111/8, chapter 15, 268–270; cf. vol. 111/7, chapter 6–7, 22–26.

60 Telesio, *De rerum natura* vol. 111/7, chapter 7, 28.

and sense-creating, as well as regulated to its inner needs. Sensation, then, consists in the reaction of the spirit to its own alterations. Since the spirit is made of hot and mobile matter, this reaction itself is a motion.<sup>61</sup> In its central seat, the spirit stores the motions that have caused its alterations. For Telesio, it is the various types of physiological traces (including warmth and cold) that are stored in memory, rather than the perceptions themselves or their images, as Aristotle had erroneously held.<sup>62</sup> This coded information, incorporated in the physiological structure of the spirit, forms the basis for all other types of cognition. All other cognitive functions, including imagination, memory, and discursive reasoning or intellectual thought, are derivative and spring from a 'recalling motion' ('motus recolens').<sup>63</sup> They all depend on sensation, to which they are essentially subordinated.<sup>64</sup> Repeated perception brings about a certain habit in addition to cognition of the motion with which the spirit has been moved and of the passions that it undergoes. As a consequence, we are able to imagine what we have perceived. This habit is most similar to capacities such as singing, dancing, and playing the lute.<sup>65</sup> Intellection thus consists in the recollection of past motions or passions in and by the spirit ('recolitio passionum motuumque').<sup>66</sup> Thus, Telesio assimilated intellection to imagination and described it as 'commemoratio' or 'existimatio'.<sup>67</sup>

Whether the sensitive and the rational souls are really distinct from one another had already been a subject of vigorous discussion in the Middle Ages. In Telesio, this question assumes a physiological dimension, as it is always the

61 Telesio, *De rerum natura* vol. III/7, chapter 4, 14–16.

62 Telesio, *De rerum natura* vol. III/8, chapter 29, 298. As a matter of fact, Aristotle's position was slightly different. According to Aristotle, sense perception occurs when sense organs are affected by external stimuli; it consists in the production of sensory representations called *phantasmata*. The latter are not identifiable with iconic (or pictorial) images, however, because they comprise elements of all five senses. For a critique of Aristotle's conception of phantasy; cf. Telesio, *De rerum natura* vol. II/5, chapter 39, 444.

63 Telesio, *De rerum natura* vol. II/5, chapter 31, 386–388.

64 Telesio, *De rerum natura* vol. III/8, chapter 2–3, 164–172; vol. III/8, chapter 9, 200f. The context of this valuation is the refutation of the Peripatetic doctrine of the hierarchy of cognitive faculties, from 190ff. This refutation is built on the methodological rule, expressed in vol. I/3, 240: 'Non modus, sed res'. For discussion, see my "Elementi aristotelici e polemica anti-peripatetica nella dottrina dell'anima divina di Telesio".

65 Telesio, *De rerum natura* vol. III/8, chapter 2, 162–164.

66 Telesio, *De rerum natura* vol. III/8, chapter 28, 294 and chapter 29, 298. Memory requires the continuous attention of the spirit (vol. III/8, chapter 10, 204).

67 Telesio, *De rerum natura* vol. III/8, chapter 3, 170.

same substance that perceives, imagines, remembers, and thinks.<sup>68</sup> As for the role of imagination and intellectual thought, he points to their ability to inform the spirit of things that are distant, absent, or partly unknown. When something is perceived incompletely, this incomplete cognition will be completed through a comparison with previous perceptions.<sup>69</sup> At the same time, imagination and intellection may lead us astray, because the spirit easily confounds notions linked to distinct perceptions.<sup>70</sup>

Telesio regarded cognition as a 'work of nature' ('opus naturae') which depends either on actual sensation or on similitude.<sup>71</sup> Insofar as it is a reconstruction of those parts of the cognitive objects that are unknown or obscurely perceived, intellective cognition is based on a 'similitude perceived by the sense' ('similitudo sensu percepta').<sup>72</sup> In the case of man, it is the divine soul that is called upon to perform these operations, but the divine soul itself must rely on the spirit's capacity to recall past motions.<sup>73</sup> In primary perception, the spirit is able to detect similarities as well as diversity in the affections it undergoes.<sup>74</sup> These very similarities, once detected by the spirit, provide the basis for imagination and all rational thought.<sup>75</sup> According to Telesio, the spirit somehow conceptualises and articulates the informational content of perception: repeated experiences affect the physiological structure by weaving patterns into it, which amount to habits, images and concepts. Thus, a cognitive

68 See, for example, Telesio, *De rerum natura* vol. 111/8, chapter 10 and chapter 17, 200–208, 244–250.

69 Telesio, *De rerum natura* vol. 111/8, chapter 3, 164–172.

70 Telesio, *De rerum natura* vol. 111/8, chapter 17, 246: 'Et imaginans seorsum, quod praeteritos motus recolenti juncti ii interdum obvii fiunt, quibus seorsum mota est; intelligens vero, quod bene diversis et contrariis interdum entibus, si non vere eadem, at persimiles et quae e longinquo praesertim perceptae eadem videri possunt, insunt conditiones; itaque enti indi possunt, cujus non sunt'.

71 Telesio, *De rerum natura* vol. 111/9, chapter 30, 446: 'Praeterea ut experientiae etiam sit opus rerum cognitio, at quin magis naturae sit, ambigi ceret non potest'. Characterizing cognition as the work of nature, Telesio reverses the medieval and Renaissance dictum 'opus naturae est opus intelligentiae'.

72 Telesio, *De rerum natura* vol. 111/8, chapter 3, 170: 'Itaque intellectionis cujusvis principium similitudo est sensu percepta'; see also chapter 7, 186–188; chapter 8, 192; chapter 17, 246.

73 Recall that all mental states, also those of the divine soul, are strictly sense-dependent; cf. Telesio, *De rerum natura* vol. 111/8, chapter 6 and 15.

74 Telesio, *De rerum natura* vol. 111/8, chapter 7, 186.

75 See Telesio, *De rerum natura* vol. 111/8, chapter 4 and vol. 111/8, chapter 28, 174 and 294–296.



structure emerges from patterns of recurrent sensorimotor activity, duly recognised by the spirit.

### Mental Acts and Representations

Telesio's perceptual and cognitive theory goes beyond a mere stimulus-response correlation. The spirit interacts with the world, but also with its own internal states: it imagines, stores, and remembers the things perceived.<sup>76</sup> Those operations, in which the spirit functionally reflects its internal projection onto itself, are traditionally called 'imagination' and 'thought'. Telesio however preferred the term 'memory' ('commemoratio'), because of the fact that all mental operations following upon direct sensation depend, as we have heard, on a 'motus recolens'.

Imagination and cognition derive from experience, but not exclusively so. The incoming stimuli are elaborated according to the pre-existing structure and architecture of the 'spiritual system'. Symbolic and conceptual structures arise from two sources: the structured nature of bodily experience (the perceived 'similitudines'), and a hard-wired capacity to convert certain well-structured aspects of bodily and interactional experiences into abstract concepts. Evidently, no stimuli are independent of the perceptual apparatus that receives them and elaborates upon them.

Conversely, the responses of living organisms are not well-defined physical events. In this respect, Telesio did not abandon traditional psychological terminology altogether. Indeed, it is remarkable, from a historical point of view, that Telesio implicitly abandoned the formal identity between physical stimuli and sensory response, and yet believed that the soul is able to perceive the nature of present and absent things, and to infer essential features of its own nature.<sup>77</sup>

Telesio devised a psychology of cognition which dispensed with representations as bearers of content. Indeed, an analogue of such traditional notions indicating perceptual or mental representations as the Aristotelian *phantasma*, the Epicurean *prolepsis*, the Stoic *phantasia*, or the Scholastic *species* are

76 Telesio, *De rerum natura* vol. III/8, chapter 2, 162–164.

77 Telesio, *De rerum natura* vol. III/8, chapter 15, 248–250. His is in contrast, for example, with the position of the ancient Cyrenaics, and later materialists, such as Hobbes and Gassendi. In this sense, we cannot say that Telesio eliminated Aristotle's ontology of forms and essences. In this context, see also the thesis that the immortal soul is the *form* of the body.

altogether absent from his system. To be sure, the spirit does produce actual internal representations in response to external stimuli (which are received as passions) and to internal stimuli (which are the preserved affections and motions of the spirit). However, it nowhere manipulates images or traffics with pictures.<sup>78</sup> Mental representations exist as actual construals, or more precisely as reconstructions of the world.

Telesio believed that the soul grasps natural reality by means of physical interaction; even the divine, immaterial soul cannot access natural reality without the aid of the spirit.<sup>79</sup> Accordingly, universal knowledge is not the result or final act of a structurally hierarchical process. That is to say, it does not consist in the gradual abstraction of similitudes or species. Indeed, an important part of Book VIII of *De rerum natura* is devoted to a detailed refutation of the Peripatetic doctrine of hierarchically conceived cognitive faculties.<sup>80</sup> This means that no ambivalent 'dissimilar similitude' ('similitudo dissimilis') is required between sensible reality, senses, and intellect.<sup>81</sup> Nor does the

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78 Cf. the polemics with Aristotle's overly narrow conception of fantasy. Telesio argued that Aristotelian fantasy depends on stored images. For a similar position in modern psychological research, see Gregory R., *Concepts and Mechanisms of Perception* (London: 1975) 628. There is an extensive contemporary discussion as to whether mental images are pictorial, descriptive, or iconic. Cf., inter alia, Pylyshyn Z.W., "Imagery and Artificial Intelligence", in J.M. Nicholas (ed.), *Images, Perception and Knowledge* (Dordrecht: 1977) 170–194; Kosslyn S., *Image and Brain. The Revolution of the Imagery Debate* (Cambridge – Massachusetts: 1994).

79 Telesio, *De rerum natura* vol. II/5, chapter 6, 184; vol. III/8, chapter 15, 232–234, 236; chapter 28, 294–296: 'Nam etsi, ut dictum est, non spiritus ipse in hominibus, sed substantia a Deo immissa intelligit, quoniam, dum in corpore ea inhabitat, agentibus naturis et corruptioni omnino obnoxio, spiritus ministerio atque opera intelligit; itaque ea modo intelligit, quae e rerum sensu perceptarum similitudine intelligi possunt, et quae spiritus ei intelligenda veluti offert aut ministrat'. Cf. also vol. II/5, chapter 2–3.

80 Telesio, *De rerum natura* vol. III/8, chapter 16–20. According to Telesio, a possible distinction between the cognitive faculties should be grounded in an essential distinction between their objects, not in different ways of perceiving them; cf. vol. III/8, chapter 16, 240: 'Non modus scilicet, quo res cognoscuntur, sed ipsae intuentiae sunt res'; chapter 20, 262: 'Non scilicet a passionis perceptionisve diversitate [...], sed a rerum, quae percipiuntur, diversitate animae dissimilitudo declaranda Aristoteli erat'. Thus, as regards the knowledge of natural reality, there can be no essential difference between sense and intellect. See also Telesio, *De rerum natura* vol. III/9, chapter 34, 470.

81 Only as 'similitudo dissimilis' are the sensible and intelligible species of scholastic psychology capable of connecting the ontologically different levels of material reality, the senses, and the immaterial intellect.

notion of 'similitude' any longer need to connect hierarchically distinct levels. In Telesio's cognitive psychology, 'similitudo' is not the mental representation of an individual essence, but rather a common feature of a plurality of perceived sensible objects.

### Concluding Remarks

Telesio effectively dispensed with the view of the imagination as the faculty that mediates between the senses and the intellect, instead defining it as a capability of the spirit that makes up the human soul. Telesio suggested a physiological model of the mind that dispenses with an 'intelligent being' as bearer of psychological functions. His psychology was thus, we may conclude, a first step towards a non-circular explanation of intelligent behaviour. Mental events supervene upon activities of the spirit and upon the spirit's transactions with the environment. Telesio envisaged no simple reduction of psychology to physics, but firmly grounded the realm of the mental in that of physiology.

In Telesio's view, the spirit's operations do not rely on internal representations, nor are sensory and intellectual experiences stored as images or concepts. Perception, imagination, and cognition do not consist of the detection or assimilation of formal features of the environment. Rather, they are the result of the spirit's active response to alterations caused in its physiological structure by external stimuli. Perception involves the gathering of information about the environment on the basis of physical stimuli impinging on the sensory structure. The stimuli impinging on the sense organs push the soul to a reaction, namely sensation.<sup>82</sup> Relatively primitive stimuli cause remarkably rich, fine-grained, and complex responses. This result must be ascribed to the capacities of the spirit, a powerful and extremely mobile mix of heat and matter. The peripheral spirit transforms the physical energy of the affections into a coded, information-bearing structure, which provides data for the (mental) processes of the central portion of the spirit in the brain. The subsequent higher-level elaboration is progressively selective in its response to features of the sensory stimuli. Notice, however, that the familiar input-output scheme of modern psychology only partially applies to Telesio's psychology. Telesio did

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82 The significance of the information provided in the patterns of excitation on the sense organs is not merely a matter of how it relates to the nature and programming of the nervous system, but of how it relates to what the organism as a whole has to do to deal with the environment.

not think of the spirit as receiving or extracting information from the environment. It is impossible to ignore the part played by the spirit in perception. Sensory experiences are not passive affections, but acts of a living being, which operates according to sensations of pleasure and pain. The spirit's principal activity is that of making changes in itself.

Telesio agrees with Aristotelian tradition in recognizing that a direct form of realism, according to which the world affords a direct transfer of information that would suffice for perception and action, is untenable. How, then, does he explain the ability to categorise objects and events on the basis of sensory signals received from the environment? Like some medieval and Renaissance Aristotelians, Telesio rejected the distinction between mental act and representation, and held that conceptualisation depends on precedent, primary mental acts. And yet, his precise view of the matter cannot be rephrased in the Aristotelian framework. For him, cognition and conceptualisation consist of a process of self-modification by the spirit. The spirit neither receives nor abstracts forms, but reconstructs past experiences or integrates them on the basis of past motions or traces stored in its own structure. The latter are not some sort of interface between the spirit's conceptual powers and the external world. Rather, Telesio tried to show that the facts of human knowledge, memory, and recall argue against the view that such cognitive activities involve an iconic and sensory pattern, as is implied when we speak of forms or images. Mental content is not located in particular symbols or representations, but is a sort of function of a state of the spirit. Conceptions are acts, not referents of thought. Thus, representing is based on an ability to organize perceptual data, not on (iconic) representations. Cognition and memory depend on the capacity to arrive at states similar to some previous states, rather than on calling on what has been stored there.

### **The Aftermath: Tommaso Campanella, Descartes, and the Northumberland Circle**

As is well known, Telesio inspired several early modern philosophers. He was without doubt the primary philosophical source of inspiration for Tommaso Campanella, whose views with regard to human cognition were essentially a faithful rendering of Telesio's thought. Campanella duly emphasised the material nature of the human soul insofar as it could be identified with the spirit, arguing that an incorporeal sensitive soul could not be the subject of bodily sensations. The spirit, a subtle, ethereal, bright, and warm substance, dwells in the head as in a fortress, and roams about the nervous system like a pilot

on a ship.<sup>83</sup> Campanella also shared his master's polemical attitude toward the noetics, cognitive psychology, and doctrine of distinct cognitive faculties of the Peripatetics.<sup>84</sup> According to Campanella, the fact that sense perception involves a real engagement with external stimuli does not mean that external simulacra enter into the spirit.<sup>85</sup> A 'res sentiens' can only receive another form when it simultaneously loses its own form, as in wood being burned. In fact, Campanella regarded a 'modica immutatio' as a sufficient basis for sensation.<sup>86</sup> In sensation there is always a partial alteration of the spirit through assimilation. According to Campanella, the sensible object exerts a real action, not an intentional one, upon the soul: the spirit receives motions, not images or species.<sup>87</sup> Perception is concerned with the alterations these motions cause in the spirit, which is why sense cannot be an immaterial power.<sup>88</sup> Like Telesio, Campanella assigned memory, imagination, and intellection to the bodily spirit.<sup>89</sup> Actual perception is 'passio presentis' while intellection is 'passio absentis'.<sup>90</sup>

However, just as in Telesio, some problems afflict Campanella's account of perception and knowledge. Sense perception is seen as perception of a 'passio', brought about by external motions in the spirit. Campanella's account fails to explain, however, how perception *in se* comes about, and thereby commits the fallacy of circular reasoning. Again, his view entails a representational theory of sense perception: it is not the objects themselves that are perceived, but only their effects on the spirit.

The view that motion triggers sense perception was later endorsed by English philosophers and by René Descartes. Like Telesio and Campanella, Descartes denied the need for mediating formal principles in sense perception and intellectual cognition. However, he did not accept Telesio's views regarding the materiality of the soul. In some texts, he seems to endorse a position according to which the mind, quite problematically, perceives the motions in the brain. Elsewhere, however, he emphasised the mind's natural capacity to

83 Campanella Tommaso, *Philosophia sensibus demonstrata* (Naples, Horatius Saluianus: 1591) 85; Campanella Tommaso, *De sensu rerum et magia* (Frankfurt, Ludovicus Boullenger: 1620; reprint, Turin: 1975) 54.

84 Campanella, *De sensu rerum et magia* 121–123.

85 Campanella, *De sensu rerum et magia* 106.

86 Campanella, *De sensu rerum et magia* 108. On the basis of a partial assimilation, the mind can obtain knowledge of the object through a process of reasoning.

87 Campanella, *De sensu rerum et magia* 113; see also 123.

88 Campanella, *De sensu rerum et magia* 113–115.

89 Campanella, *De sensu rerum et magia* 131.

90 Campanella, *De sensu rerum et magia* 133.

respond to motions and patterns in the brain. According to Descartes, this response is what primarily constitutes perception. Endorsing a Cartesian-style dualism of mind and body, many other seventeenth-century philosophers argued for a view of knowledge acquisition as only occasionally dependent on sensory representation or brain traces.

Starting in the 1960s, studies on early-modern natural philosophy in England have emphasised the role of the Northumberland circle in transmitting and elaborating ideas resumed from the naturalist strand of Italian Renaissance philosophy. Moreover, they suggested that through the Northumberland circle, Italian Renaissance philosophy also influenced the Cavendish circle, eventually inspiring even Thomas Hobbes's natural philosophy and psychology.<sup>91</sup> In the 1980s, Karl Schuhmann and Jan Prins have called attention to the influence of Telesio's work in England.<sup>92</sup> Schuhmann has argued that Telesio and Hobbes approached philosophy in a comparable way. Likewise, Prins's investigation of Walter Warner's notes on animal organisms have suggested that Telesio's psychological theories probably exerted a stronger influence in early seventeenth-century England than has been assumed, on account of the authority of Francis Bacon.<sup>93</sup>

The apparent affinity between Telesio's naturalistic philosophy of mind and the psychological research by early modern English scientists and philosophers does not automatically entail that the latter depended upon the Cosentino philosopher. Rather, they shared with Telesio a common philosophical and scientific orientation, which was characterised by anti-scholasticism and materialism. The psychological theories of Telesio, Warner, and Hobbes are grounded in a central conviction: mental phenomena supervene upon physiological processes, which can essentially be analysed in terms of motion.

Telesio broke away from a merely metaphorical use of motion, favoured in medieval and Renaissance psychological works, and resumed the kinetic aspects of Hellenistic psychology. He regarded motion as the spirit's proper activity and grounded both perception and cognition in specific types of motion. Also, Warner described the activities of the spirits as motions. Hobbes reduced

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91 Kargon R.H., *Atomism in England from Harriot to Newton* (Oxford: 1966) 5–42; Jacquot J., "Harriot, Hill, Warner and the New Philosophy", in Shirley J.W. (ed.), *Thomas Harriot: Renaissance Scientist* (Oxford: 1974) 107–127.

92 See Schuhmann K., "Hobbes and Telesio", *Hobbes Studies*, 1 (1988) 109–133; Prins J., "De invloed van Telesio in Engeland", in Vandenakker G. (ed.), *Filosofiedag Utrecht 1989* (Delft: 1989) 154–160.

93 Prins J., *Walter Warner (ca. 1557–1643) and His Notes on Animal Organisms*, PhD dissertation (Utrecht University: 1992).

perception to a complex ensemble of causal relations in a mechanical, physical system. According to him, perceptions are motions and ideas and concepts are elaborations of the motions occurring in the perceptual apparatus. Thus, perception itself became a kind of movement or, more precisely, a causal reaction to external motion. With this theory, Hobbes averted Campanella's problematic view of perception as consisting in a perception of 'passiones'. This points to a remarkable development in psychological theorizing. While Telesio and Warner, more or less explicitly, linked motion to the nature of the spirit(s), Hobbes adopted a relational concept of motion. For him, the human soul does not move in virtue of its nature; rather, as a natural entity, it may itself be analysed in terms of matter in motion.<sup>94</sup>

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## Giovan Battista Della Porta's Imagination

*Sergius Kodera*

Touchstone: Truly the tree yields bad fruit.

Rosalind: I'll graff it with you, and then I shall graff it with a medlar: then it will be the earliest fruit i' the country; for you'll be rotten ere you be half ripe, and that's the right virtue of the medlar.

SHAKESPEARE, *As You Like It* III, 2: 124–29



### Introduction

Giovan Battista Della Porta (1535–1615) was one of Europe's main proponents of a decidedly non-academic yet erudite natural magic. His works on this topic as well as on physiognomy, ciphers, the art of memory, distillation, and optics earned him a place among the most famous and popular scientific authors of his day.<sup>1</sup> In addition to traditional recipe books and expliqués of trade secrets, he also wrote accounts of his own experiments.<sup>2</sup> In his own time, Della Porta

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1 For a succinct biography, cf. Romei A., "Della Porta", in Capelletti V. (ed.), *Dizionario biografico degli Italiani*, vol. 37 (Rome: 1989) 170–182. On Della Porta and the inquisition, see Valente, M., "Della Porta e l'inquisizione. Nuovi documenti dell'Archivio del Sant'Uffizio", *Bruniana & Campanelliana* v.2 (1999) 415–434.

2 Cf. Eamon W., *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton, New Jersey: 1994). Della Porta Giovan Battista, *Della magia naturale del sig. Gio. Battista Della Porta napolitano. Libri 20 libri XX* (Naples, Giacomo Carlino – Collantino Vitale: 1611) 388 (*Proemio* to lib. IX): 'Noi habbiamo raccolte alcune cose raccolte da'i scritti de gli antichi delle migliori, che ci parevano, l'habbiamo sperimentate, e le buone l'habbiamo portate qui, ma assai sono migliori quelle della nostra inventione, e de'i ritrovati de' i più moderni, che anchora non sono state stampate [...]'. On the popularity of *sperimenti* among 'professors of secrets', see Eamon W., *The Professor of Secrets: Mystery, Magic and Alchemy in Renaissance Italy* (Washington, D.C.: 2010) 57.

was one of the most renowned ‘professors of secrets’,<sup>3</sup> and also authored at least seventeen successful works for the stage, some of which are important mannerist plays.<sup>4</sup> Characteristically, Della Porta’s thought and practice also naturalise human beings through a science of *physiognomonics*, which posits a metonymic relationship between natural objects, animals, plants, human beings, and the stars. As I have argued elsewhere in greater detail, the various genres of Della Porta’s vast literary and scientific production cannot be viewed in isolation; taken together, they provide an important resource for understanding the relationship between popular and literary culture, art, social politics—and what I would call, for brevity’s sake, Della Porta’s *scienza*.<sup>5</sup>

In *Wonders and the Order of Nature*, Lorraine Daston and Katharine Park explore Della Porta’s deep interest in the marvellous and his concern with demonic arts, and situate him, together with Marsilio Ficino (1433–1499), Pietro Pomponazzi (1462–1525), Heinrich Cornelius Agrippa von Nettesheim (1486–1535), and Girolamo Cardano (1501–1576), in an influential group of ‘preternatural philosophers’.<sup>6</sup> Within this tradition, Della Porta developed a ‘sublime science’ tailored for a courtly environment. And yet—as we shall see—Della Porta’s approach differed considerably from the highly sophisticated Neoplatonic magic envisioned by Marsilio Ficino. The label ‘preternatural’ might apply less to Della Porta than to other Neoplatonic magic theorists, since his published texts betray a deep interest in the occult properties of herbs, stones, animals, and human beings, but only insofar as they were considered *natural*.<sup>7</sup> In his magic, Della Porta thus sidesteps theological subjects such as

3 I borrow this term from Eamon, *Professor of Secrets* 195, who categorises ‘the professors of secrets’ as a ‘scientific underworld’.

4 Clubb L.G., *Giambattista della Porta, Dramatist* (Princeton, New Jersey: 1964), is still by far the best introduction to Della Porta’s theatrical works.

5 See Koder S., “Humans as Animals in Giovan Battista della Porta’s *scienza*”, *Zeitsprünge* 17 (2013) 414–432; idem, “The Laboratory as Stage: Giovan Battista della Porta’s Experiments”, *Journal of Early Modern Studies* 3.1 (2014) 15–38.

6 Daston L. – Park K., *Wonders and the Order of Nature, 1150–1750* (New York: 1998), 160: “The objects of preternatural philosophy coincided with the traditional canon of marvels. They included both the results of occult action such as magnetic attraction and the reputed power of the amethyst to repel hail [...] and rare individual phenomena, such as bearded grape vines, celestial apparitions, and rains of frogs and blood”. Ibid., 162: “Demonology was in some ways the alter ego of preternatural philosophy, for demons also worked marvels”. Ibid. 159–164.

7 On Ficino’s magic and Renaissance magic in general, see the wonderfully succinct and copiously referenced introduction by Copenhaver B.P., “How To Do Magic and Why: Philosophical Prescriptions” in Hankins, J. (ed.), *The Cambridge Companion to Renaissance Philosophy* (Cambridge: 2007) 137–170.

God, the immortality of the soul, or demons. He attempts to develop a strictly natural magic, where 'natural' signifies that the formal principles constituting the moving agents in the cosmos are 'occult' and the causes for the often marvellous properties of objects are per se unknowable. In this perspective, the observable qualities of certain material dispositions are embodied signs of a larger and ultimately divine cosmic order to which all natural bodies, including human beings, are subject. Della Porta's natural magic is also defined by a marked tendency to eclipse human agency, with the exception of the capacity of the natural magus who, because of his natural talent and ingenuity, is in a position to manipulate and command the natural properties of objects. Indeed, Della Porta's arts of natural magic, his experiments, and his *physiognomonics* are characterised by a (at times rather notoriously) hands-on approach. Of all the authors mentioned Della Porta was perhaps the most engaged in applying such knowledge to the fabrication of marvels with the intention of stirring the imagination (in the broadest sense of the term) of his audiences. 'Wonder became a reflection not of ignorance but of virtuosity and connoisseurship; the product not only of great experience and erudition, but also of impeccable taste'.<sup>8</sup> Della Porta's interest in exploring the powers and qualities of the imagination is thus not primarily motivated by theory, but is geared towards exploiting the occult and marvellous powers of the human imagination broadly conceived. It is therefore hardly surprising that the imagination looms large in Della Porta's work.

### Della Porta: A Master Manipulator of the Imagination

Although Della Porta did not devise a coherent theory of the imagination, the topic figures prominently and variously in his numerous published texts. This essay addresses some of the many different occasions on which Della Porta touches on the subject. He does so explicitly, for instance, when discussing the formative role of the maternal imagination in the act of conception of human life; but also implicitly, in the countless marvellous recipes (*segreti*) in the two editions of his *Magia naturalis* (1558, 1589). Cross-breeding between various animals and human beings, for example, parallels the human imagination's capacity for producing fictitious entities.<sup>9</sup> Some of Della Porta's *segreti* clearly

8 Daston – Park, *Wonders and the Order of Nature* 170.

9 For a very good introduction to the two different editions of the *Magia Naturalis* (1558, 1589), see Balbiani L., *La Magia naturalis di Giovan Battista Della Porta: Lingua, cultura e scienza in Europa all'inizio dell'età moderna* (Bern et al.: 2001).

belong to a literary genre we would today call science fiction, written evocations of objects or events which Fabian Krämer has recently termed ‘factoids’.<sup>10</sup> Yet even if a considerable number of these *segreti* are actually unreliable reports of marvels derived from various classical sources, such as Pliny’s *Natural History*, Aristotle’s *Problems*, or Ovid’s *Metamorphoses*, their function was not necessarily less important than Della Porta’s reports of the marvellous experiments, which are actually feasible.<sup>11</sup>

The fabrication of such ‘factoids’ could, I maintain, have been intended to demonstrate Della Porta’s ingenuity as a natural magician: he frequently concludes his *segreti* by stating that he has only provided basic instructions for how to perform a given marvel, although he could offer much more. These reports of more or less feasible and marvellous ‘experiments’ were thus at least in part designed to create a strong impression upon the imagination of the

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- 10 On the notion of ‘factoid’, which Fabian Krämer has recently coined for the early modern literature on monsters: Krämer F., *Ein Zentaur in London. Lektüre und Beobachtung in der frühneuzeitlichen Naturforschung* (Affalterbach: 2014). As Schechner, a museum curator and specialist in historical mirrors, argues from a slightly different perspective in Schechner S.J., “Between Knowing and Doing: Mirrors and Their Imperfections in the Renaissance”, *Early Science and Medicine* 10 (2005) 137–162, here 141: ‘There were many books printed in the sixteenth and seventeenth centuries that depicted marvellous instruments that never existed or if constructed, would not have performed as well as described nor been widely used. These books read like science fiction, and their primary goal was not to instruct readers in the use of instruments but to impress patrons of the author’.
- 11 That Della Porta seems to have been so optimistic about his powers of creating new life by means of mere spontaneous generation was, I believe, due to the apparent success of the incubator for hen’s eggs which he invented and which he describes in great detail (Della Porta Giovan Battista, *Natural magick*, anonym. transl. [London, printed for Thomas Young and Samuel Speed: 1658, reprint, New York: 1957], 157–158, bk. 4, ch. 26). But we must see these inventions in their specific context—namely, as a demonstration of the magus’s ability to produce the most marvelous monsters. The youthful first edition of the *Magia* divulges the *segreto* of how to inseminate a hen’s egg with human sperm, thus producing a little monster. Della Porta Giovan Battista, *Magiae naturalis, sive de Miraculis rerum naturalium libri IV* (Antwerp, Christoffel Plantijn: 1560), fol. 81r, lib. II, ch. 24: ‘Si quis vero curiosius, quam par sit, noscere concupiscet, quam nouimus rationem experimento fimo & mirabilem ad Modum mandragoram producendi. Sic enim humanam feram ex ouo enatam foeneratitia iam nomenclatura vulgò appellari coepisse audio, si cui collibuerit, & is ad exemplar galli spermatis in ouo humanum, & vitale asperserit virus, operculo coercito ne foetus calorem coarctum suspiret, efferet semiferum animal, hinc humanam, hinc verò vernaculam gerens formam. Nec negat id Avicenna’.

reader.<sup>12</sup> My thesis is that these non-factual practices also delineate methods for intervention into and manipulation of the human imagination.

### Della Porta's Intellectual Backdrop: Peripatetic Facultative Psychology and Renaissance Neoplatonic Doctrines of the Soul

Readers of Della Porta's texts who expect to find a systematic or explicit theory of the imagination will be disappointed. Even so, the intellectual context in which Della Porta refers to the human imagination can be reconstructed; these ideas can be situated in the context of Aristotelian medieval and Renaissance faculty psychology.<sup>13</sup> According to this intellectual tradition, the faculty of the imagination belongs to the organic soul, and more precisely to the inner senses. The imagination receives sense impressions from the *sensus communis*, out of which it generates images. These images are impressions which carry the form of the perceived thing, but not its matter: they are subsequently passed on to the higher faculties of reason and—ultimately—of the will and intellect. Sometimes the faculty of the imagination was meant to supply yet another faculty, *phantasia*, with its images.<sup>14</sup> *Phantasia* is endowed with the power to recombine the representations of the sense impressions provided by *imaginatio* (or the images stored in the memory). *Phantasia* is thus capable of producing images with no correspondence in reality—for instance, golden mountains.<sup>15</sup>

12 Piccari P., *Giovan Battista della Porta: Il filosofo, il retore, lo scienziato* (Milan: 2007) 52 goes so far as to say that '[...] nel caso di Della Porta non di semplice meraviglia si tratta, non di viva sorpresa, ma di *stupore*, di quel senso di grande e superiore meraviglia che lascia attoniti di quello stato di gioia ineffabile dinanzi ai prodigi della natura [...]']'.

13 For a brief introduction to medieval and Renaissance faculty psychology, and notions of the organic soul, see Park K., "The Organic Soul", Schmitt C.B. – Skinner Q. (ed.), *The Cambridge history of Renaissance Philosophy* (Cambridge: 1988) 464–485 and *passim*.

14 It remains unclear though whether these images were of a merely optical nature or general representations of all the senses' impressions. For a discussion which focuses on Aquinas, see Tellkamp J.A., *Sinne, Gegenstände und Sensibilia: Zur Wahrnehmungslehre des Thomas von Aquin* (Leiden: 1999) 258.

15 Park, "The Organic Soul" 471: 'Imagination stored these data before passing them on to fantasy, which acted to combine and divide them, yielding new images, called *phantasmata*, with no counterparts in external reality'. See also Lisska A.J., *Aquinas's Theory of Perception: An Analytic Reconstruction* (Oxford: 2016) 221–228 on Aquinas, who did not posit a separate faculty of *phantasia*, but rather held that capacity to produce free combinations (for instance, an image or *idolum* of a golden mountain) was exclusive to the human imagination. Thomas Aquinas, *Summa theologiae*, 3 vols., ed. P. Caramello (Turin, Rome: 1952), vol. 1, 381, col. a (1<sup>a</sup>, 78 a 4) and, 403, col. b (1<sup>a</sup>, 83 a 1).

Acting as a medium between the material and the noetic worlds, the faculties of *imaginatio/phantasia* are thus both receptive and creative.<sup>16</sup> Obviously, the distinction between the two faculties was more often than not merely nominal, at least as far as human beings were concerned: the question of whether animals too had the ability to freely combine images and thus produce new forms continued to be disputed.<sup>17</sup> Due to its double and mediating nature at the crossroads between sense and abstract thought—between immediate receptiveness, memorised images, and the production of new images from a wealth of forms—*imaginatio/phantasia* was considered the direct and indirect cause of several kinds of ailments. The imagination was believed to be able seriously to affect the entire human body and thus also to endanger the wellbeing of the individual soul. Medieval physicians identified, for example, an illness they called *amor hereos*: a state of mad love caused by an obstinate erotic fixation on a product of the imagination.<sup>18</sup> Serious distortions of *imaginatio/phantasia* could, it was thought, be caused by lesions of the central ventricle of the brain, which was believed to be the seat of the imagination.<sup>19</sup> To fulfil its most important function, communication between the body and the soul, *imaginatio/phantasia* relied on another entity, the so-called *spiritus*.<sup>20</sup>

16 Thomas Aquinas, *Summa theologiae*, vol. 1, 414, col. a–b (1<sup>a</sup>, 84 a 7).

17 Tellkamp, *Sinne, Gegenstände und Sensibilia* 258–59.

18 Beginning with Avicenna's *Canon medicinae* on the subject of mad love, the somatic foundation of *amor heroicus* was frequently the object of debate in contemporary medical, magical, and philosophical texts. See, for one *locus classicus* from 1303–05, Gordon, *Lilium medicinae*, fol. 210r–211v. (ch. 20), which also gives drastic instructions for curing this ailment. Della Porta examines the phenomenon in various places, for instance in the second edition of the *Magia naturalis*, Della Porta Giovan Battista, *Magia naturalis libri XX* (Rouen, Johannes Berthelin: 1650) 331, lib. 8, ch. 14; see also below. For a concise introduction to the general subject: Beecher D.A. – Ciavolella M. (eds.), *Eros and Anteros: The Medical Traditions of Love in the Renaissance* (Ottawa: 1992) 66–86. For Renaissance sources discussing the phenomenon, see Ficino Marsilio, *De amore: Commentaire sur le Banquet de Platon Marsile Ficin*, ed. and trans. R. Marcel (Paris: 1956), 224–25, lib. 6, ch. 9 and 324–226, lib. 7, ch. 4; Garzoni Tomaso, *L'ospidale de' pazzi incurabili*, ed. S. Barelli (Rome: 2004) 314–315 (Discorso 18: “De' pazzi d'amore”).

19 Thomas Aquinas, *Summa theologiae*, vol. 1, 414, col. b (1<sup>a</sup>, 84 a 7); Tellkamp, *Sinne, Gegenstände und Sensibilia* 231.

20 The most succinct account of the intricate concept of *spiritus* is still Walker D.P., “The Astral Body in Renaissance Medicine”, *Journal of the Warburg and Courtauld Institutes* 21 (1958) 119–133. Walker writes, at 120: ‘Medical spirits are very fine, hot vapour, deriving from the blood and breathed air. They are corporeal. They are usually divided into three kinds; natural, vital and animal [...]. The vital spirits are manufactured in the heart and conveyed by the arteries; their main function is to distribute innate or vital heat to all

These beliefs about the powers and the functions of *imaginatio/phantasia* were further developed, one could even say radicalised, through the tradition of Renaissance natural magic.<sup>21</sup> With Marsilio Ficino's influential commentary on Plato's *Symposium*, *imaginatio/phantasia* began to assume a key explanatory role in the Renaissance Neoplatonic theory of natural magic. In the Neoplatonic hierarchy of being as devolved by Plotinus, the soul shapes and produces the body it inhabits.<sup>22</sup> In that process, the soul crucially relies on *imaginatio/phantasia* as its chief instrument to communicate with its body. As an ostensibly non-demonic practice, Ficino's magic relied on the postulate that a universal animation permeates the entire cosmos. A corollary to this postulate was the assumption that all things in the hierarchy of being—from heavenly bodies and human beings to animals, plants, and stones—were guided and connected by the universal forces of love and hate, of attraction and repulsion. In human beings, these cosmic forces manifest themselves especially in the faculty of *imaginatio/phantasia*. The images generated in *imaginatio/phantasia* were of a most subtle physical nature: they were made of *spiritus*. *Spiritus* was supposed to be a half-physical, half-noetic mediator between the two realms: a vaporous, ultra-refined product of the human blood. In Ficino's influential formulation, this *spiritus* is a 'subtle body, not a body', a mediator outfitted with paradoxical qualities.<sup>23</sup>

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parts of the body. Animal spirits are elaborated from these and are contained in the ventricles of the brain, whence through the nervous system they are transmitted to sense-organs and muscles; their functions are motor-activity, sense-perception, and, usually, such lower psychological activities as the appetite, *sensus communis*, and imagination. They are the first, direct instrument of the soul'.

21 For the magical uses of the imagination, see Zambelli P., "L'Imaginazione e il suo potere", *Miscellanea Mediaevalia* 17 (1985) 188–206; Giglioni G., "Coping with Inner and Outer Demons: Marsilio Ficino's Theory of the Imagination", in Haskell Y. (ed.), *Diseases of the Imagination and Imaginary Disease in the Early Modern Period* (Turnhout: 2011) 19–51; Fattori M. – Bianchi M. (eds.), *Phantasia-imaginatio. V Colloquio internazionale, Roma 9–11 Gennaio 1986* (Rome 1988).

22 Ficino, *De amore* 170–171, lib. 4, ch. 3.

23 Ficino Marsilio, *De vita libri tres: Three Books on Life*, ed. and trans. C.V. Kaske – J.R. Clark (Binghamton, New York: 1989) 256, lib. 3, ch. 3: 'Ipse [sc. *spiritus*] vero est corpus tenuissimum, quasi non corpus et quasi iam anima, item quasi non anima et quasi iam corpus'. For Ficino's doctrine of *spiritus* as more or less embodied garments of the soul, see *ibid.* 41–42; Walker D.P., *Spiritual and Demonic Magic: From Ficino to Campanella* (London: 1958), 4–8, 12–14, 48–50; Hub B., "Material gazes and flying images in Marsilio Ficino and Michelangelo", in Göttler C. (ed.), *Spirits Unseen: The Representation of Subtle Bodies in Early Modern European Culture* (Leiden: 2008) 93–120.

*Spiritus* images were believed to have the capacity for producing strong movements of the soul—and in tandem, of the body—such as love or hatred and their related physical reactions. As we shall presently see, *spiritus* is used by the soul as an instrument to shape and rule the body it inhabits. The images generated by the faculty of *imaginatio/phantasia* were even endowed with the potential for infecting other people's bodies: it was believed that *spiritus* was emitted by the eyes and could infect others, spreading not only diseases but also, for instance, mad love. Notoriously contagious inflammations of the eye (such as *keratoconjunctivitis epidemica*) provided some empirical evidence for this set of ideas.<sup>24</sup> In the context of Ficino's Neoplatonic metaphysics of love, *imaginatio/phantasia* thus became strongly associated with erotic attraction, obsession, desire, sex, and the re-production and new production of images. Even so, Ficino was primarily interested in investigating the metaphysical implications of this set of theorems—that is, in the relationship between the higher ontological entities, such as star-demons, and the individual human soul. By contrast, Della Porta attempts tacitly to elide the astrological

24 Ficino, *De amore* 246–249, lib. 7, ch. 4–5; Della Porta, *Magia naturalis* 343–346, lib. 8, ch. 14: 'Nec solum qui continuo, sed hospites, et qui eorum commercio alienissimi concutiuntur, tanta oculis vis et fascinum, qanquam per contactum, et miscellam iniatur saepe; per oculos tamen perficitur: ut si exterminatio quaedam spiritus per oculos ad fascinantem cor deveniens, totumque inficiens. [...] Si vero pulchri desiderio, formaeque concinnitatis ferit desiderio irretitum, [...] per oculos venenum hauritur, et venustae spectrum formae amantis cordi residet [...]: et quia ibi mollissimus amati sanguis vagatur, vultus repraesentat, suique ipsius sanguine relucet, [...] et sic ab eo trahitur, ut vulnerati sanguis in vulnerantem labitur. [...] et plures foeminas, quam viros effascinatrices reperies, complexionis ratione, fortiori enim lapsu a temperamento descendunt, plurimisque noxiis vescuuntur, ut singulis mensibus superfluitatibus expleantur, et sanguis ebulliat melancholicus. Unde vapores orti sursum elati per oculos prolabantur, et astantibus venenum expirant, et tali corpus explent. Unde sanguinei, ex parte quadam cholerici, et qui oculos habent amplos, nitentes et glaucos et caste vivunt, (ne frequenti coitu humorum succus exhauritur) qui frequentissimo intuitu, diutissima imaginatione, aciem aciei dirigat, radii radiis, et lumina luminibus coniungantur, fortasse amorem accendere poterit.[...] Evenit enim ex fascinantis intentione, qui quidem per spiritus, sive vapores transmittitur ad maleficium, et spiritu illo affectus, ei similis afficitur: existente enim maxime in passione illa, et imaginativa virtute circa rem valde fixa, habitus diu permanens, spirituum habet obedientiam et sanguinis: tunc exoptata re potest a virtutibus devinciri, et inflammari'. For the entire context, see Hub B., 'Aristotle's 'Bloody Mirror' and Natural Science in Medieval and Early Modern Europe', in Frelick N. (ed.), *The Mirror in Medieval and Early Modern Culture* (Turnhout: 2016) 31–71, esp. 59–60 and passim, and Kodera S., *Disreputable Bodies: Magic, Gender, and Medicine in Renaissance Natural Philosophy* (Toronto: 2010) 105–111 for the larger context.



implications of Ficino's approach. Instead, he highlights the idea that *spiritus* is a powerful material 'essence' which an inventive *magus* can extract from (almost) every body, most conspicuously by means of distillation.<sup>25</sup> Della Porta's concern is to use these powerful essences and their occult properties for the creation of marvels (*meraviglia*).

### Maternal Longings

One key empirical corollary for the extraordinary formative powers of the imagination over the body in Renaissance natural magic was the ancient belief that if a woman is exposed to a strong sensation or harbours an intense longing during intercourse or pregnancy, this state could influence the formation of the embryo in her womb. According to this theory, the image of its mother's obsession was impressed on the foetus, and the future child would thus physically resemble the desired entity. Della Porta makes direct reference to these matters. Initially, one has the impression that he is simply repeating the highly popular theories concerning maternal longing encountered in authors as diverse as Ficino and Castiglione. Della Porta remarks that, 'Many children have hare-lips; and all because their mothers being with child, did look upon a hare'.<sup>26</sup> For this phenomenon he provides an elaborate explanation:

Plutark, in his rehearsal of the opinions of Philosophers, writes that Empedocles held that an infant is formed according to that which the mother looks upon at the time of conception: for, saith he, women were wont to have commonly pictures and images in great request, and to bring forth children resembling the same. [...] The conceit of the mind, and the force of Imagination is great; but it is then most operative, when it is excessively bent upon any such thing as it cannot attain unto. Women

25 The idea that *spiritus* is a subtle vapour akin to wine spirits or alcohol goes back to medieval alchemical and early-modern iatrochemical traditions. See Koderá, S., "The Art of the Distillation of 'Spirits' as a Technological Model for Human Physiology. The Cases of Marsilio Ficino, Joseph Duchesne and Francis Bacon", in King H. – Horstmannshof M. – Zittel C. (eds.), *Blood, Sweat and Tears. The Changing Concepts of Physiology from Antiquity into Early Modern Europe* (Leiden: 2012) 111–136, esp. 148.

26 Della Porta, *Natural Magick* 51, bk. 2, ch. 19. For an earlier text, see, for instance, Ficino, *De amore* 252, lib. 7, ch. 8: 'Praegnantēs saepe mulieres vinum, quod avidissime cupiunt, vehementer excogitant. Vehemens cogitatio spiritus movet interiores atque in iis excogitate rei pingit imaginem. Isti sanguinem movent similiter et in molissima fetus materia vini imaginem expriment'.

with child, when they long most vehemently, and have their minds earnestly set upon any thing, do thereby alter their inward spirits; the spirits move the blood, and so imprint the likenesse of the thing mused upon, in the tender substance of the child. And surely all children would have some such marks or other, by reason of their mothers longing, if this longing were not in some sort satisfied. Wherefore the searchers out of secrets have justly ascribed the marks and signes in the young ones, to the imagination of the mother; especially that imagination which prevails with her in the chiefest actions, as in coition, in letting go her seed, and such like: and as man of all other living creatures, is most swift and fleeting in his thoughts, and fullest of conceits; so the variety of his wit affords much variety of such effects; and therefore they are more in mankind, then in other living creatures: for other creatures are not so divers minded, so that they may the better bring forth everyone his like in his own kind. Iacob was well acquainted with this force of imagination, as the Scriptures witness.<sup>27</sup>

This sort of phantasmatic fixation on the mother's part could even lead to monstrous births.<sup>28</sup> According to this belief, such *imaginamenta* of excep-

27 Della Porta, *Natural magic* 51–52. The original Latin version of this passage (Della Porta, *Magia naturalis* 87–88, lib. 2, ch. 19) reads: 'Plutarchus in Philosophorum placitis ait Empedoclem visu sub conceptum infantem formari, etenim mulieres, simulacra saepiuscule statuasque in deliciis habuisse similesque iis partus enixas. [...] Magnus est animi affectus, vel vis imaginationis: maximus vero dum sui in excessum fertur, ut id assequi imaginatione minime queat. Gerentes uterum mulieres, quando vehementissime cupiunt, vehementerque excogitant, spiritus immutant interiores, et in his excogitatae rei pinguntur imagines, ij sanguinem movent, unde in mollissima foetus materia rei imaginem exprimunt, sic partus in perpetuum maculis, variisque notis inficiunt, nisi desiderio refricato quiescant. Ideo rerum exploratores non impune exquisivere, ita signari, uti cogitat anima, et maxime in praecipuis actionibus, ut in maris congressu, spermatis eiectione, et aliis ideo homini quum insit cogitationum velocitas, animique celeritas, et ingenii varietas, multiformes imprimit notas plures idcirco in homine, quam in caeteris animalibus differentiae: aliis eimim quum immobiles sint animi, singulis in suo genere similia procreandi datur facultas. Hanc animi vim, et cogitationis recte novit Iacob, uti sacrae testantur literae'.

28 Pancino C., *Voglie materne: Storia di una credenza* (Bologna: 1996). On the close connection between the imagination and monstrous births in relation to the organic soul, and on Empedocles as the 'source' for these ideas dear to Ficino, see Huet M.H., *Monstrous imagination* (Cambridge, Mass.: 1993) 4 and 18–19; Koder S., "Ingenium. Marsilio Ficino über die menschliche Kreativität", in Leitgeb M.C. – Stéphane Toussaint S. – Bannert H. (eds.), *Platon, Plotin und Marsilio Ficino. Studien zu Vorläufern und zur Rezeption des Florentiner*

tional creatures or of other marvels are capable of acting on the *spiritus*, by extension affecting the pregnant woman's entire body and ultimately determining the shape of the future child.<sup>29</sup> Ficino deployed this set of beliefs about the maternal imagination to corroborate the assumption that the powers of the imagination could not only affect the individual exposed to them, but that such *imaginamenta* also have the potential to shape *other* bodies. Ultimately these images were believed to be of celestial origin. In the following passage from the *Theologia Platonica*, Ficino's astrological and cosmological bias in this matter is well expressed:

And what one might call the fatal imaginations which gradually arise in the idola of these souls, like the vehement desires of pregnant women, they take whatever they are imagining to themselves and express it in

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*Neuplatonismus* (Vienna: 2009) 77–94. For a vehement criticism of such creeds, see Wier Johann, *De praestigiiis Daemonum Libri sex* (Basle, Johannes Oporinus: 1577) 178, col. B, lib. 2 and 356 col. B, lib. 3; Thomas Aquinas, *Questiones disputate*, 2 vols., ed. P. Bazzi (Turin: 1953), vol. 2, 543, col. b (De malo, q 4 De peccato originali, a 8 ad 13: '[...] imaginatio est vis quaedam in organo corporali; unde ad speciem imaginatam mutatur spiritus corporeus; in quo fundatur vis formativa, quae operatur in semine; et ideo interdum aliqua imitatio fit in prole ex imaginatio, parentis in ipso coitu, si sit fortis'. Ficino Marsilio, *Theologia Platonica*, *Platonic theology*, ed. J. Hankins – W. Bowen, trans. M.J.B. Allen – J. Warden, 6 vols., (Cambridge, Massachusetts.: 2001–2006), vol. 4, 110, lib. 13, ch. 1: 'Quam manifeste praegnantis mulieris aviditas tenerum foetum inficit rei cogitatae nota! Quam varios filiis suis gestus figurasque parentes [...] imprimunt propter vehementem rerum diversarum imaginationem qua dum coeunt casu aliquo afficiuntur!' For a medical source from the early seventeenth century that lists all these different beliefs but is highly critical of them, see Bauhin Kaspar, *De Hermaphroditorum monstrosorumq[ue] partuum Natura ex Theologorum, Jureconsultorum, Medicorum, Philosophorum, & Rabbinorum sententia: Libri Duo [...]* (Oppenheim, Hieronymus Galler: 1614) 116–122. For a recent discussion of such monstrous births, see Krämer, *Ein Zentaur in London*.

- 29 On the term *imaginamenta* in this context, see Ficino Marsilio, *Opera omnia* (Basle: 1576; reprint, Turin: 1962) 1815 [802] (*In Theophrastum*, ch. 2): 'Phantasia, id est, imaginatio acrioribus motibus suis varie afficit spiritum, per quae hoc reliquum corpus quoniam haec intuitum suum dirigit intro circa imaginamenta sua, sensus autem dirigitur ad externa, neque percipit passionem instrumenti, vel speciem, quae ad sensum conferunt, sed per haec duo percipit, quae sunt extra, iam actionibus suis non alterat spiritum, non enim terminatur actus eius ad intima, sed externo'. On *imaginamenta* as deceptive images, Ficino, *Opera omnia*, 1201 [197] (*In Parmenidem*, ch. 2). On *imaginamenta* of demonic quality, see Ficino, *Opera omnia* 1295 [289] (*In Sophistam*, ch. 2); on the role of *imaginamenta* in magic and divination, see Ficino, *Opera omnia* 1890 [890] (Iamblichus, *De mysteriis*). For the larger context, see Scheuermann-Peilicke W., *Licht und Liebe: Lichtmetapher und Metaphysik bei Marsilio Ficino* (Hildesheim: 2000) 210.

their spheres and in what attends the spheres as though in embryos. Our soul also, which is disposed towards this body according to the order of its own seeds, fashions the body in a way of the very power which rules over the body.<sup>30</sup>

Ficino believed that the formative power of these astrological signs could be channelled into magical amulets, which he recommended for medical purposes, to be used to condition the imagination positively. Notably, he bestowed considerable power on man-made artefacts over the imagination of individuals.<sup>31</sup> Works of fine art, as well as the *imaginamenta* evoked by reading or by hearing music, may therefore affect the beholders in the ways described above.

### Artwork in the Bedchamber: Shape or Material?

In the circular reasoning characteristic of natural magic, this set of beliefs about the imagination also had implications for purposefully shaping future children, by positively conditioning the imagination of the mother. A frequently repeated *segreto* for beautiful children recommends exposing women during intercourse and pregnancy to paintings or sculptures of beautiful children, to influence the future child's shape via beautiful *imaginamenta*.<sup>32</sup> Della Porta refers directly to the bedchamber practice:

[...] place in the bed-chambers of great men, the images of *Cupid*, *Adonis*, and *Ganymedes*; or else [...] set them there in carved and graven works in some solid matter, [...] whereby it may come to passe, that whensoever their wives lie with them, still they may think upon those pictures, and have their imagination strongly and earnestly bent thereupon: and not only while they are in the act, but after they have conceived and

30 Ficino, *Theologia Platonica*, vol. 4, 190–191, lib. 13, ch. 4: 'Atque, ut ita dicam, fatales imaginationes, quae gradatim idolis animorum illorum suboriuntur, quasi praegnantium mulierum affectus vehementissimi, quicquid sibi fingunt, in sphaeris suis sequentibusque tamquam foetibus expriment. Nostra quoque anima erga corpus hoc affecta secundum suorum seminum ordinem corpus hoc ex ipsa vi corporis rectrice figurat'.

31 See for instance *ibid.*, 190, lib. 13, ch. 4.

32 For an introduction to the history of these seemingly widespread practices and the related artwork during the Renaissance, see Musacchio J.M., *The Art and Ritual of Childbirth in Renaissance Italy* (New Haven: 1999) 128–139.

quicken'd also: so shall the child when it is born, imitate and expresse in the same form which his mother conceived in her mind, when she conceived him, and bare in her mind, which she bare him in her wombe.<sup>33</sup>

This would constitute a standard account of the process of perception, as the imagination receives the imprint of a thing, albeit without its specific matter.<sup>34</sup> Yet as Porta continues this description of the effects of maternal *imaginamenta*, a variant of that account emerges:

And I know by experience, that this course will take good effect; for after I had counselled many to use it, there was a woman, who had a great desire to be the mother of a fair Son, [...]. She procured a white boy carved of marble, well portioned every way; [...]. And when she lay with her Husband, [...] she would look upon that image, [...] she brought forth a Son very like in all points, to that marble image, but especially in colour, being as pale and white, as if he had been very marble indeed.<sup>35</sup>

From this passage it becomes clear that for Della Porta, it is not so much the *imaginamentum* of the beautiful *shape* of a body that is assimilated into the mother's imagination, subsequently modelling the future child according to the outlines of the beautiful statue; it is, rather, the specific *quality* of the matter out of which the artwork is made that is transmitted first to the maternal imagination and then imitated in the embryo. The baby's body resembles less

33 Della Porta, *Natural Magick* 53. The Latin original reads somewhat differently, as follows (Della Porta, *Magia naturalis* 91, lib. 2, ch. 20): '[...] ut in magnatum cubilibus, & prospectu, Cupidinis, Adonidis, & Ganymedis imagines propendeant, vel materia parentur solida: unde Venerem exerentes, uxores animo eas versent, imò fortissima imaginatione animus rapiatur, et gravidæ diutius eas contemplentur, sic partus inde conceptus eam fomam imitabimur; quam ipsae coeuntes, et utero gerentes mente conceperint'.

34 Aristotle, *De anima* 417a21ff und 424a17–19; see Tellkamp, *Sinne, Gegenstände und Sensibilia* for a discussion in Thomas Aquinas.

35 Della Porta, *Natural Magick* 53–54. The original Latin reads as follows (Della Porta, *Magia naturalis* 91, lib. 2, ch. 20): 'Quum id saepius praecepissem, audivit quaedam mulier pluchros filios parere percipiens, statimque candidum, marmoreum puerum, beneque formatum ante oculos sibi proposuit, talis enim formae puerum exoptabat, coeundo, & uterum gerendo, quam saepissime animo eum volutabat, enatumque postea foetum ostendit mater obesulum, nec a marmoreo simulacro dissimilem, sed ita pallentem, ut verum imitaretur marmor, & et veritatis experientia patuit'.

the form of the imaged statue than the whiteness and texture of the marble of which the statue is made: the baby resembles the statue's *matter*.

This distinction between the form and the matter of a work of art is hardly trivial, albeit elusive. As Brian Copenhaver pointed out long ago, it was exactly this boundary that Ficino's theory of natural magic had endeavoured to erode, between the imperceptible substantial form (*forma substantialis*) and its perceptible shape (*figura*).<sup>36</sup> Ficino had to make this move in order to render plausible the idea of how the substantial form—e.g., a precious stone—is altered when the *figura* of a certain celestial sign is engraved in it, and how in that process the stone may become a magically potent talisman. This line of argument had allowed Ficino to assume that a form of talismanic magic was feasible without demonic intervention. He argued that, although altered through *human* intervention, the substantial form of the object had nevertheless—through this very intervention—been altered in such a way as to attract and channel the cosmic forces emitted by a kindred planet or star. Ficino famously explains this reciprocal process in the *De vita*, citing evidence of maternal longings.

I think that inasmuch as even people uniting to beget offspring often imprint on children to be born long afterwards not only the sort of countenances they then wear but even the sort of countenances they are merely imagining, in that same way the celestial countenances rapidly impart to materials their characteristics. [...] Therefore you should not doubt, they say, that the material for making an image if it is in other respects entirely consonant with the heavens, both conceives in itself the celestial gift and gives it again to someone who is in the vicinity or wearing it.<sup>37</sup>

36 Copenhaver, "How to Do Magic and Why" 146–147, qualifies the thesis of idem, "Astrology and Magic", in Schmitt C.B. (ed.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988) 264–299. See also idem, "Magic", in Park K. – Daston L. (eds.), *The Cambridge History of Science. Volume 3. Early Modern Science* (Cambridge: 2006) 518–540 and the discussion in Weill-Parot N., *Les "images astrologiques" au moyen âge et à la renaissance: Spéculations intellectuelles et pratiques magiques (XII<sup>e</sup>–XV<sup>e</sup> siècle)* (Paris: 2002) 645–649.

37 Ficino, *De vita* 330–332, lib. 3, ch. 17: 'Quippe cum etiam coeuntes ad prolem plerunque vultus, non solum quales ipsi tunc agunt, sed etiam quales imaginantur, soleant filiis diu postea nascituris imprimere, vultus eadem ratione coelestes materias confestim suis notis inficiunt, in quibus si quando diu latitare videntur, temporibus deinde suis emergunt. [...] Ergo ne dubites, dicent, quin materia quaedam imaginis faciendae, alioquin valde congrua coelo, per figuram coelo similem arte datam coeleste munus tum in se ipsa concipiat tum reddat in proximum siquem vel gestantem'. It is interesting to note that in

In the Neo-Platonic hierarchy of being, the shape of an object (*figura*) is ranked higher than the matter out of which the object is composed, because an object's form is more closely related than its matter is to geometry and thus to ideal and abstract forms. This concept is also prominent in Renaissance fine art and related considerations on *disegno*.<sup>38</sup> When a painter or sculptor transfers a perceived form onto any suitable material, it is the shape (*figura*) of the matter that changes, not its quality. Likewise, accounts of the effects of maternal longings referred more to newborns' distorted *figura* than to their newfangled matter.

The difference between Ficino's and Della Porta's accounts of the effects of maternal *imaginamenta* is thus a difference of emphasis: whereas Ficino emphasised the idea that the *spiritus* is a medium that responds to the formative, celestial, and, ultimately, astrological qualities of its subjects, Della Porta underscores the material aspects of *spiritus*, and the resonances it may cause in sublunar bodies. In his account, the maternal *imaginamentum* thus transmits not so much the *disegno*, but the *colore* (to use the terms of Renaissance art theory)—and apparently also the *texture*—of the represented object. Accordingly, Della Porta tends to eclipse the formal and abstract aspects of the *imaginamentum* as a *medium*, instead highlighting its somatic foundations. The *imaginamenta* are subtle replicas of the entire substance of the thing they represent, not images (*figurae*) abstracted from the matter of the objects (*species*) they represent.<sup>39</sup> As a medium for transmitting these material qualities, the *spiritus* not only represents these qualities; it embodies them, because somehow its own substance is substantially assimilated into the object it represents.

Della Porta's willingness to relate the effects of the maternal *imaginamenta* to the material qualities rather than to the *figura* of an object is also evidenced by his remarks on the affective power of music, a central topic in Renaissance natural magic theory in general. By dint of a melody's structural affinity to mathematical proportions (and according to the realm of Platonic forms) music was believed to be a powerful means not only for affecting individual

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this passage Ficino seems to hold that *both* parents have an influence on the shape of the future baby, whereas in the quote above it is only the mother influencing the shape of her future child. See Stimilli D., *The Face of Immortality: Physiognomy and Criticism* (Albany, NY: 2005) 70–72 for a commentary on Ficino's wording in that passage.

38 See also Kemp W., "Disegno: Beiträge zur Geschichte des Begriffs zwischen 1547 und 1607", *Marburger Jahrbuch für Kunstwissenschaft* 19 (1974) 219–240.

39 As is the case according to Thomas Aquinas, *Summa theologiae*, vol. 1, 3879, col. a–b (1<sup>a</sup>, 78 a 3).

souls, but also for evoking (more or less benevolent) forms of higher intelligence, such as angels or demons.<sup>40</sup> In his detailed description of the effects music has on the human imagination and the passions it may stir, Della Porta says, in reference to Pythagoras:

But if we would seek out the cause of this, we shall not ascribe it to the Musick, but to the Instruments, and the wood they are made of, and to the skins; since the properties of dead beasts are preserved in their parts, and of Trees cut up in their wood, [...]. And to take the most noted examples, if we will *Fright Sheep*, there is Antipathy between Sheep and Wolves, [...] and it remains in all their parts; so that an instrument strung with Sheep strings, mingled with strings made of a Wolfs guts, will make no Musick, but jar, and make all discords. *Pythagoras*.<sup>41</sup>

According to Della Porta, the power of music over bodies and souls is thus *not* caused by the mathematical and formal structure represented in the harmony of a melody. It is, instead, the specific matter of which instruments are made that exerts power over the imagination, since this material quality creates a resonance in the kindred *spiritus*. This line of argument is analogous to Della Porta's ideas on the potential of the maternal imagination: just as he held the *figura* of an object to be less decisive in altering the baby's shape than its matter, he also holds that the tune is not the cause of music's occult power over our

40 Cf. Walker, "Ficino's Spiritus and Music." In that context the phenomenon of resonance is crucial because it is an instance where action may be observed at a distance. For a panoramic introduction to this topic from the mid- seventeenth century, see Kircher Athanasius, *Athanasii Kircheri musurgia universalis sive ars magna consoni et dissoni* (Rome, Lodovico Grignani: 1650) 2 vols, vol. 2, 364–367.

41 Della Porta, *Natural Magick* 403. The Latin original reads as follows (Della Porta, *Magia naturalis* 627, lib. 20, ch. 7): 'Sed si nos huius causam perscrutari velimus: non modis, sed fidibus, et instrumentorum ligno, et pellibus attribuemus, quum mortuorum animalium, et succifarum arborum etiam in membris et lignis proprietates conserventur, [...]. Et ut exempla adducamus a notissimis. Si volumus Oves exterrere. Antipathia est inter lupos et oves, [...], omnibusque earum membris inhaeret, ita quod fides de intestinis ovium, cum fidibus de intestinis luporum permistae non concordant, sed obstrepunt, et omne interturbant temperamentum, ex Pythagora'. For a brief overview of the topic of the antipathy of sheeps and wolves in Avicenna and the concept of a *virtus aestimativa*, see Strohmaier, *Avicenna*, 75; for a more detailed discussion, see for example Herzberg S., *Wahrnehmung und Wissen bei Aristoteles: Zur epistemologischen Funktion der Wahrnehmung* (Berlin – New York: 2011) 158–160.



souls. As with the maternal imagination, it is the physicality of the instrument that informs music's marvellous effects on the imagination.

In Della Porta's later *Coelestis physiognomonía* ('celestial physiognomics'), he presents an even more explicit formulation of this idea. In this text, Della Porta denies outright that the human imagination has any potential to shape the body of a future child, instead maintaining that an individual's physical traits (such as a porcine human face and a 'piggish' body) derive from residual animal humours (*humores animales*) in the maternal body—and that such formations also indicate the habits (*mores*) of the individual (which in this case would be similar to pigs).<sup>42</sup> These humours also constitute the infallible descriptors in Della Porta's *Art of Physiognomics*, because from these animal traits one can deduce the individual habits (*mores*) of humans, which are akin to the habits of the animals they physically resemble. Interestingly, the ecclesiastical ban on astrology and astrological causation of individual human traits thus seems to have indirectly contributed to the development of physical explanations for mental phenomena.<sup>43</sup>

Ficino's and Della Porta's accounts of the imagination differ in degree: Ficino highlights the ability of the faculty of the imagination to transmit the *figura* of an object, whereas Della Porta underscores the notion that the *imaginamentum* cannot be abstracted from the matter of the object it represents, and emphasises the resonances that physical affinities (as opposed to formal affinities) may cause. In Della Porta the *imaginamentum* is a subtle body that embodies the material qualities of things; it is, therefore, in a position to evoke an image of that body. For Della Porta, the *imaginamentum* (made up of *spiritus* and the perceived image in the traditional account) is a subtle but material

42 Della Porta Giovan Battista, *Coelestis Physiognomonía: Della celeste fisionomia*, ed. A. Paoletta (Naples: 1996) 140, lib. 5, ch. 2: 'Sed id alia de causa [sc. non ex imaginatione mulierum fixa] evenire putandum est, quippe ex redundantibus in corpore humoribus animalibus illis similibus, sic porcinam similitudinem in vultu referunt et corpore: et physiognomones ex eorum animalium vultus similitudine mores praesagiunt'.

43 Cf. Koderá, *Disreputable Bodies* 270–271 on the distinctions between natural and judicial astrology (the latter inevitably predicting certain events in the lives of individual beings), and the vigorous ban on all divinatory arts of 1586 (even ruling out the prediction of mere inclinations, which until then had been a very common practice), see Baldini U., "The Roman Inquisition's Condemnation of Astrology: Antecedents, Reasons and Consequences", in Fragnito G. – Belton A. (eds.), *Church, Censorship and Culture in Early Modern Italy* (Cambridge: 2001) 79–110, esp. 81–82, 91–93; and passim on the difficulties of upholding that distinction and consequently the general enforcement of the ecclesiastical ban.

essence of a thing more than a formal recreation of a sense impression.<sup>44</sup> In this context, we must recall that Della Porta pretended he could extract such powerful essences from nearly every substance by means of distillation. In fact, it is the distillation of wine spirits that serves as paradigmatic technological testimony to this claim.<sup>45</sup> And indeed, the phenomenon of condensation and rarefaction of liquids serves Della Porta as a general physiological explanation for our perception of distorted, hybrid, or even monstrous images in our dreams: he maintains that vaporous images of the foods we have eaten—produced by the contents of our stomachs—rise to our brains, where they are cooled. This causes the vaporous images to condense, and to descend from the head to the region of the heart, which is the seat of the senses. On their way down, these vapour-images mix with other vapour-images ascending from the stomach, and this collision produces the monstrous images we perceive in our sleep.<sup>46</sup> As in Della Porta's accounts of maternal longings and his analysis of

44 It is interesting to note that this idea is already present in Thomas Aquinas's account of the physical efficacy of the imagination, since Thomas maintained (in a passage already quoted above) that the *spiritus* as a material entity changes into material effigy of the imagined object: '[...] imaginatio est vis quaedam in organo corporali; unde ad speciem imaginatam mutatur spiritus corporeus; in quo fundatur vis formativa'. *Questiones disputate*, vol. 2, 543, col. b (*De malo*, q 4 *De peccatu originali*, a 8 ad 13). Of course Thomas does not talk about the extraction of such *spiritus* forms by artificial means.

45 Koderá, "Art of Distillation" 148–149 and passim.

46 Della Porta, *Magia naturalis* 325–326, lib. 8, ch. 3: 'Cibus, ex concoctione, [...] tabescit, et in vaporem solvitur, quem caliditate iuncta, in leve desciscere par est, quumque natura in sublime feratur, aliquantenus attolli, et in cerebrum per venas redundare, ubi cerebrum perpetuo obrigens frigore, ad instar nubium generationis, ut in maiori mundo visitur, sit humificium, et nebulascit. Sic intestina reciprocatione denuo ad cor defertur, principis sensus domicilium: interim caput opplet, gravedinosum reddit, ut profundo demergatur somno. Unde imagines descendentes, aliorum vaporum occursu, interpolantur, ut praeposteræ, monstrosæque videantur, idque in noctis conticcinio. [...] Non ergo irrationale duximus, quum immoderato tumefacta potu virtus sopita lagueat, tum ex natura edulii vapores attolluntur, tum ex iis, quæ corpore abundant, in somno exultari et immoderate iactari, ut diversa incendia, tenebrae, grandines, putredines ex flava, atraque bili, frigido, putridoque humore. Sic aliquem trucidari, vel impie cruentari, sanguinis abundantiam habere, immo temperiei eiusdem praesagituram elicit posse. Hippocrati & Galeno placet, unde cibis vescentes flatuosis, eorum vi salebrosæ imagines, monstruosæque, qui itidem attolluntur: si tenuis, modicaeque exhalationis gratis animam exhilarant simulacris. Sic etiam extrinsecus applicando simplicia, secum illius rei phantasmata infecta sensuum principi deferunt'. Here a physiological model created by Avicenna (who conceptualises important physiological processes such as digestion along the technological model of distillation) seems to have been the formative model for Della Porta. See Koderá, "Art of Distillation" 146–147, with further references.

the effects of music, it is the subtle material essence of a thing (as opposed to its visible form) that causes sensation. Della Porta describes various *segreti* for the preparation of such essences in order to create impressive *imaginamenta*.<sup>47</sup>

### Drugs and the Imagination

Della Porta claimed that he was in the possession of recipes for potions (*segreti*) which could not merely create some sort of hallucinations, but that could evince predictable *phantasmata* in other people's minds:

For by drinking a certain Potion, the man would seem sometimes to be changed into a Fish, and flinging out his arms, would swim on the ground. Sometimes he would seem to skip up, and then to dive down again. Another would believe himself turned into a Goose, and would eat grass, and beat the ground with his teeth, like a Goose. Now and then sing, and endeavor to clap his wings. And this he did with the forenamed plants. Neither did he exclude Henbane among his ingredients, extracting the essences by their Menstruum, and mixing some of their brain, heart, limbs, and other parts with them. I remember when I was a young man, I tried these things on my chamber fellows. And their madness still fixed upon something they had eaten, and their fancy worked according to the quality of their meat. One, who had fed lustily upon beef, saw nothing but the forms of Bulls in his imagination, and them running at him with their horns, and such like things. Another man also by drinking a Potion, flung himself upon the earth, and like one ready to be drowned, struck forth his legs and arms, endeavouring, as it were, to swim for life. But when the strength of the medicament began to decay, like a shipwrecked person, who had escaped out of the sea, he wrung his hair and his cloths to strain the water out of them, and drew his breath, as though he took such pains to escape the danger. These, and many other most

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47 Della Porta's *segreto* for the (in)famous unguent employed by witches is a case in point: according to him, the nocturnal flights and orgiastic encounters with demons and the devil which form the stock of trade of witchcraft lore are in fact hallucinations caused by *atropa belladonna* (deadly nightshade, a plant that containing a psychotropic substance called atropine). On the history of this recipe and the trouble it caused its author, see Balbiani, *La Magia naturalis* 59.

pleasant things, the curious enquirer may find out. It is enough for me only to have hinted at the manner of doing them.<sup>48</sup>

Here, Della Porta postulates a causal relationship between the formation of an *imaginamentum* and the sort of meat (*et ex cibi qualitate imagines observantur*) ingested. In an argument that runs parallel to his explanation for the workings of maternal longings as well as the magical effects of music on the imagination, Della Porta declares that it is not the *figura* of the bull but the fact that you swallow the meat of the beast (together with the extracted essences of other substances with occult properties) and then assimilate it into your blood that gives you the illusion of *being* a bull.

A nexus of ideas also informs Della Porta's accounts of marvellous tricks he claims to have performed with magical lamps. In order to construct an effective magical tool, he mixes lamp oil with essences he extracts from various animals.

But if you wish people to have heads of horses or of asses, you are embarking on a difficult work; nevertheless, painstaking attention will help you to overcome the difficulty of this issue. Cut off the head of a horse or of an ass that is alive,—in order that the virtue [of it] not be feeble—and have a pot prepared that is large enough to fit [the head] in, fill it to the brim with oil and lard, and close [the pot] with a strong clay, and expose it for three days to a gentle fire, in order for the oil to form a broth and

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48 Della Porta, *Natural Magick* 219–220. The Latin original reads as follows (Della Porta, *Magia naturalis* 324–325, lib. 8, ch. 2.): ‘Quamcunque, vel animal, & insanias ad libitum producebat: potionato quodam medicamento, nunc videbatur ipsum se in piscem mutatum, atque iactis in brachiijs in solo natebat, et nunc resilire, nunc vero submergi videbatur; alterum vero in anserem conversum, et ore herbas convellebat, ac dentibus terram percutiebat, ut anser, nunc vero canebat, nitebaturque alas movere. Hoc autem faciebat supra dicits plantis, nec ab his hyoscyamum secludebat, extractis per sua menstrua essentii, admiscebatque iis decorum artibus, corde, cerebro, et aliis. Memini dum illa iuvenis experier in contubernalibus, eorum insanias versabantur circa ea, quae prius commederant, et ex cibi qualitate imagines observabantur. Unus qui bovinam carnem multam ingurgitaverat, non nisi boves in imaginibus observantes videbat, ab eis cornibus impeti, et alia eiusmodi. Potionato etiam quodam medicamento vir in terra projicitur, atque ut submersusurus brachia, et pedes movebat, nitebaturque se a morte eripere: ubi autem vis medicamenti obsolescit, quasi qui è mari evaserit, naufragus capillum, et vistimenta comprimebat, ut inde aquam exprimeret, anhelabatque quasi maximo sui labore a maximo periculo evasisset, haec et complura visu iucundiora faciet curiosus investigator, sat fuerit modum attingisse.’

the boiled meat to be absorbed by the oil until the bones [the cranium] lay bare; crush them in a mortar and mix the powder with the oil; with it, you have to anoint thoroughly the heads of the bystanders. Similarly, fill the lamps with that oil and put into their centre some thin wicks made of coarse flaxen, neither too far apart nor too near, but as you need them, and you will see that they will appear with monstrous faces. And from this you can learn how to put together many things. But it appears to me to have said enough, for an attentive reader.<sup>49</sup>

These instructions are followed by an analogous *segreto* employing a recently severed human head as its basic ingredient; instead of evincing visions of animals with human heads, though, the effect is reversed—bystanders will appear as humans with animal heads.<sup>50</sup> It is useful to put these gruesome recipes into historical context. The idea that certain magic lamps could perform such tricks is very old indeed.<sup>51</sup> Significantly, one can here again observe that Della

49 Della Porta, *Magiae rerum naturalium libri IV*, fol. 65r–65v, lib. 2, cap 17: ‘Si vis autem, vt Equina, vel asinina videantur astantium capita, Difficile aggredieris opus: vincat tamen operis, sedulitas rei difficultatem: Equo abscinde caput vel asino, non mortuo, ne languida sit virtus, eiusdemque capacitatis fictilem fabricato ollam, oleo plenam, suique pinguedine, vt superemineat: os operculato, tenacique munias luto, ignem subde lentum, vt planè bulliens tribus servetur diebus oleum, elixataque caro in oleum currat, vt nuda spectentur ossa: pila tundito, pulvisque oleo permisceatur, quibus astantium capita perungantur: similiter in lampadibus stupei funiculi in medio statuuntur, nec propè, nec longè vt res postulat, & monstuoso spectaberis vultu. Ex iis multa discas componere: satis enim dixisse videor, si diligens fuerit intutior’.

50 Della Porta, *Magiae rerum naturalium libri IV*, fol. 65v, lib. 2, ch. 17: ‘Ex humano vpote [sic: capite] recenter obruncato electum oleum, animalibus faciem hominis inducit, sic variis animalium capitibus, monstrosiora reddes corpora, si iis accensis liciis illustretur domus, quod fido claude pectori nam vtì arcana ab antiquis celabantur, nec ita faciliter ex eorum eruitur dictis’. For the uses of human body parts in Renaissance medicine, see Sugg R.P., *Mummies, cannibals, and vampires: The history of corpse medicine from the Renaissance to the Victorians* (London: 2011) 9–37.

51 Della Porta, *Magiae rerum naturalium libri IV*, fol. 65v, lib. 2, ch. 17: ‘ALITER tamen docet Anaxilaus nec irritè: Equorum virus à coitu accipitur, novisque lampadibus ellychniis accensus, hominum capita, equina visui monstrefice repræsentat: de asinis sic quoque proditur’. But see also *Liber Kyrranidarum*, vol. 3, fasc. 1, 88. For a succinct introduction to this collection of magical texts and its use, see Copenhaver “Magic,” 529–31; cf. also Weill-Parot N., “Les images astrologiques”, ch. 2. and Ps.-Albertus-Magnus, “De mirabilibus mundi liber”, in idem, *De secretis mulierum libellus* (Paris: 1598) 286–327. For all sorts of recipes employing magical lamps see *ibid.* 221, e.g., has a recipe with the faces of animals in a lamp; 232 has a recipe with serpent’s fat that will cause you to see the house full of

Porta obviously believed the imagination to be prone to the physicality of the object it perceives and susceptible to the occult properties of these substances, which are present in their essences (and could be extracted by means of distillation, for example). I surmise that the *imaginamenta* are meant here to be understood in analogy to dirty and infectious *spiritus*, which result from the consumption of bad food and are among the causes of ailments inflicted by the evil eye, for example.<sup>52</sup>

### Monsters

We have seen how Della Porta explains the somatic foundations of monstrous births: it is not so much the shape but rather the material qualities and (at times) even the residual bodily fluids of other animals that he claimed were decisive for giving birth to a monster. The imagination may receive powerful impressions by merely perceiving unusual or outright monstrous objects and creatures. In this regard, Della Porta's production of *meraviglia* converges with another practice: the artful production of monsters—that is, unusual plants and creatures—by means of expert crossbreeding. Indeed, Della Porta styles himself a highly sophisticated creator of monsters. A strong structural analogy pertains between the workings of the human *imaginatio/phantasia* and the activity of the creation of monsters: both represent and combine various *imaginamenta* resulting in the production of new, unfamiliar bodies. As vaporous essences of the things they represent, *imaginamenta* have the power to shape one's body. Thus there is a structural analogy and a dialectical relationship between *imagination/phantasia* and crossbreeding. The idea that all living beings share in the same form of vital life and could therefore be more or less easily mated, resulting in marvellous monsters—free combinations of existing bodies, such as the famous golden mountains—gave this set of notions theoretical credibility.

That Della Porta was very optimistic about the potential of crossbreeding comes as no surprise.<sup>53</sup> He discusses the subject at length in both editions of

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snakes. I will treat this in greater detail in a forthcoming article. For the general context, see Thorndike L., *A History of Magic and Experimental Science*, 8 vols. (New York: 1923–1958), vol. 4, 722–723 and 729.

52 Della Porta, *Magia naturalis* 246, lib. 8, ch. 14; see above note 26.

53 Della Porta, *Magiae rerum naturalium libri* IV, fol. 41v, lib. 2, ch. 2: 'Iam per se quisque multa componere poterit: compositionum enim genera sunt innumerabilia, quae et comprehendendi, et scribi si possent, supervacuum tamen est recensere'.

his *Magia naturalis*.<sup>54</sup> Book II of the second edition of the *Magia* (1589) contains more than fifteen folio pages of detailed descriptions of how to cross-breed diverse plants, animals, and human beings with animals in order to generate new, hitherto unknown species. Della Porta contends that in mating different species of animals, the magus is merely channelling the universal procreative force from one single nature, out of a structural unity permeating the entire cosmos.<sup>55</sup> Far from being mere signifiers for abominable bodies, the abject and the monstrous bear the marks of the cunning magus's hand, for whom the possibilities of crossbreeding seem to be virtually infinite. Della Porta also supplies his readers with technical tips for crossbreeding humans and animals, with many examples that are clearly sodomitic in the modern sense of the word. '[...] for some of the Indians have usual company with brut beasts; and that which is so generated, is half a beast, and half a man'.<sup>56</sup> In order to add credibility to his claim, Della Porta cites classical authors—the usual suspects: Pliny, Herodotus, Strabo and their stories about women who were raped by billygoats, thus producing monstrous offspring.<sup>57</sup>

In this matter of animal-human crossbreeding, Della Porta's credulity outstrips that of many of his educated contemporaries, who were generally more sceptical about the possibility of producing offspring through interspecies

54 Finucci V., *The Manly Masquerade: Masculinity, Paternity, and Castration in the Italian Renaissance* (Durham, North Carolina: 2003) 58–65 has many interesting references to other authors; Fincucci explores this topic in early modern culture in a more general way.

55 Della Porta, *Magiae rerum naturalium libri* IV, fol. 33r, lib., 2 ch. 3: 'Neque id ullam nobis admirationem ingerere debet: cum vivum omne viuo sit sociabile: præcipuè, quæ in genere conveniunt, cum in unam coalescant naturam, & utrique sine alterius admixtione alimentum famuletur: ita ut fructus nascatur varius, & in uno convenient, ut fluvii duo simul congruentes, habentes uterque fontem, qua emanant'.

56 Della Porta, *Natural Magick* 2, 12, 43.

57 Della Porta, *Natural Magick* 43, bk. 2, ch. 12: 'Women lie with He-goats, and with the Cynocephali [...]. For the He-goats are so lecherous, that in the madnesse of their lust, they will set upon Virgins, and by force ravish them. *Herodotus* in the second book, writeth of a He-goat, that had to do with a woman openly, and in the sight of many men standing by. *Strabo* saith, that in the Mediterranean Sea, a little without the mouth of a River near to Sebenis and Pharnix, there is an Island called Xoas, and, a City within the Province of Sebenis, and the Cities Hermopolis and Mendes, where Pan is honoured for a God, and with him is likewise honoured a He-goat; and there, as *Pindarus* reports, He-goats have to do with women: in the utmost corner of the winding of the River Nilus, saith he, are fed certain Herds of Goats; and there the lecherous He-goats are mingled with women. *Aelianus* also writeth of the Indians, that they will not admit into their Cities any red Apes, because they are oft-times mad in lust towards women; and if at any time they find such Apes, they hunt and destroy them, as being adulterous beasts'.

sexual intercourse.<sup>58</sup> But such phenomena, of course, were cloaked in mythology, and here Della Porta's arguments also run more towards literature; his technical descriptions of sex between humans and animals are highly reminiscent of the myth of the Minotaur in Ovid's *Metamorphoses*—in which Circe's sister, the witch Pasiphaë, has sex with a young bull and conceives the Minotaur monster. This act of conception was only possible by virtue of the cunning intercession of a male master engineer: by constructing a cow-shaped frame where Pasiphaë could hide while being inseminated by the bull, Daedalus enables her to fulfil her desire.<sup>59</sup> In this remarkably imaginative and colourful myth, Ovid conjoins archaic female magic, illicit sexual desire, the art of the engineer, and crossbreeding—with a monstrous offspring as the result.

In the long passages he dedicates to the topic of crossbreeding in the *Magia naturalis*, Della Porta advocates something like a Lullian combinatory art. Viewed from this perspective, the medieval *ars combinatoria* appears in an uncommon, yet familiar context: instead of being a theory explaining how the manifold manifestations of divine Creation arise from the combination of a few abstract attributes signifying God's omnipotence (such as *bonitas*, *unitas*, *potestas* or *magnitudo*, to name but a few), Della Porta's notions of orgiastic crossbreeding point to the sheer unlimited potential of hybridisation—and, accordingly, to the many marvellous monsters that can be generated to stir human imagination.<sup>60</sup>

The analogy between artful production of monsters and the combinatory activity of *phantasia/imaginatio* is striking: this faculty is capable of producing endless combinations of *imaginamenta*. Crossbreeding—a promiscuous activity by definition—finds a parallel in the phantasmatic activity of combining (material) images. We must recall that these images possess a subtle corporeality that is especially potent in the act of conception, for here the exposure to an abject or horrendous *imaginamenta* may cause monstrous births. We have come full circle in the pattern of analogies within this *Schlitterlogik*: the

58 For a very interesting contemporary discussion of the topic, which clearly accentuates the ways in which Della Porta is bending his evidence, see Varchi, Benedetto, "Della generazione dei Mostri", in *Lezzioni di M. Benedetto Varchi* (Florence, Filippo Giunti: 1590) 85–132 esp. 99–106.

59 Ovid, *Metamorphoses*, VIII, 134–136; the literature on the Minotaur myth is of course vast, but see Bidwell-Steiner M., "Mino/Tauromaquia: Spurensuche eines Wiedergängers der spanischen Kultur", in Türschmann J. – Hausmann M. (eds.), *Das Groteske in der spanischen und lateinamerikanischen Literatur* (Vienna: 2016) 149–165.

60 Lullus Raimundus, *Ars brevis*, ed. A. Fidora (Barcelona, Posa i Bru: 1481; reprint, Hamburg: 1999) [1481]; on Lullism see, for example, Tranninger A., *Mühevolle Wissenschaft: Lullismus und Rhetorik in den deutschsprachigen Ländern der frühen Neuzeit* (Munich: 2001).



structural analogy of this set of ideas to sexual obsession and fantasy was crucial in constructing the nexus between the maternal imagination and monstrous births.<sup>61</sup>

It is at times unclear whether Della Porta himself (or his readers) believed the more fantastic claims about crossbreeding found in his texts on natural magic. Most likely, he reported them because they made for an interesting and exciting read, and they stirred the imagination. His instructions for producing physical marvels thus constitute only one part of his account: not only do his books contain workable and stunning experiments, but many of these experiments represent a kind of *ante litteram* science fiction of *factoids*. His purported expertise in generating monsters intersects with a specifically literary dimension that made these accounts as exciting as, for example, Ariosto's Hippogriff in the *Orlando Furioso*, not to mention the many monstrous bodies that populate Della Porta's theatrical works. I would argue that there is a close relationship to be observed between Della Porta's theatrical productions and his texts on natural magic.<sup>62</sup> It is thus no wonder that in his *ars memoriae*, the myth of Pasiphæe and other sexual fantasies are employed as powerful images in organizing the process of recollection.<sup>63</sup> Images of sex between humans and animals are uncannily present in the Italian version of the text, which appeared in print in Italian as *L'arte del ricordare* and was published under a pseudonym in 1566.<sup>64</sup>

61 The term was coined with regard to astrology by Warburg A., *Werke in einem Band*, ed. M. Treml, (Frankfurt/Main: 2010) 642. Cf. Gombrich E., "Icones Symbolicae: The Visual Image in Neo-Platonic Thought", *Journal of the Warburg and Courtauld Institutes* 11 (1948) 163–192, here 176; Idem, *Symbolic images* (Oxford: 1978) 173.

62 This topic is in need of further investigation, but see Kodera, "Bestiality and Gluttony".

63 On the art of memory, see Yates F.A., *The Art of Memory* (London: 1969); Bolzoni L., *The Gallery of Memory. Literary and Iconographic Models in the Age of the Printing Press* (Toronto: 2001); Carruthers M.J., *The Book of Memory: A Study of Memory in Medieval Culture* (Cambridge: 1990).

64 Cf. Della Porta, *Ars reminiscendi*; the book was published again in 1583; the Latin *Ars reminiscendi* 1602 is enlarged, but as far as the recommendations for memory images are concerned, much less offensive to general taste. On the differences between the Italian and the Latin versions, see Bolzoni L., "Retorica, teatro, iconologia, nell'arte della memoria del Della Porta", in Torrini M. (ed.), *Giovan Battista della Porta nell' Europa del suo tempo* (Naples: 1990) 337–385, 340 with footnote 5.

## Conclusion

By way of these myths of transformation from classical antiquity, we have arrived at an intersection between the literary and the scientific imaginary. These *figmenta poetarum* not only add authority to Della Porta's fantastic claims about crossbreeding: the descriptions of transformations of human beings in Ovid's *Metamorphoses* or in Della Porta's *Magia naturalis* affect and transform the reader's imagination. The images evoked in these texts are also effective in structuring the faculty of memory—to which *phantasia* takes recourse, recombining its images freely.

Throughout his work, Della Porta seeks to deploy the representative and simultaneously creative powers of *imaginatio/phantasia*, and in his texts and practices alike he cultivated a productively paradoxical understanding of the imagination. By dint of their specific material quality, *imaginamenta* have the power to transform both the beholder's body and soul.<sup>65</sup> In the bodies of pregnant women, *imaginamenta* may engender real monsters. The body and the soul may fall under the sway of *imaginamenta* created by *other* human beings; this is also true of works of art. *Imaginamenta* may thus actively infect other bodies with their powerful images. Della Porta was interested in the strong impressions these experiments would make on his audiences, and he wished them to marvel at the magician's prowess in constructing and directing his devices. Della Porta's alter ego, the learned magus, therefore had no need to elaborate a coherent theory of the causes of occult properties; rather, his objective was to employ them ingeniously, thereby manipulating his audiences.<sup>66</sup> Even so, we have seen that in Della Porta's published texts, the *imaginamentum* assumes a decidedly material character as the *essence* of the represented thing,

65 This bears striking resemblances to theories on the functions of marvel by contemporary literary theorists, such as Mazzoni, Castelvetro, and Tasso, who had in various ways all argued for a close connection between the marvellous and the believable, the 'credibile meraviglioso', through which an author could reach larger audiences and not just a highly learned public. Giglioni G., "The Matter of the Imagination: The Renaissance Debate over Icastic and Fantastic Imitation", *Camenae* 8 (2010) 1–19, here 10, 12, and 18: 'Manzoni maintained that the imagination could legitimately create fictitious universes which even common people were entitled to enjoy, provided that the images used by the artist were consistent with the beliefs shared by his community'.

66 Della Porta, *Magiae rerum naturalium libri IV*, fol. 7v–8r, lib. 1, ch. 8: 'Ideo antiqui sapientes illi terminum quendam constitutendum esse decreverunt, ultra quem rationibus progredi non possent, cum multa sint in Naturae penetralibus, occulta plena energia, quorum causas indagare nec potest, nec capit humana coniectura mentis: Naturae enim obscuritate, et abdita maiestate latent, potiusque admirari quam sciri voluit'.

carrying its visible shape. Della Porta attempts tacitly to elide the astrological implications of Ficino's approach, instead highlighting the idea that *spiritus* is a powerful material 'essence' which an inventive magus may extract from (almost) every body, most conspicuously by means of distillation.

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## Imagination in the Chamber of Sleep: Karel van Mander on Somnus and Morpheus\*

Christine Göttler

### Self-Transformers: Proteus, Vertumnus, and Morpheus

‘As Proteus transformed himself amidst the waves out of burning love for the beautiful Pomona, so does Goltzius, the admirable engraver and originator, change, with his varied art, for you, Oh Prince.’<sup>1</sup> It was in these terms that Cornelius Schonaeus (Cornelis Schoon, 1540–1611), the Catholic rector of the Latin school of Haarlem, commended Hendrick Goltzius’s (1558–1617) engravings of the *Early Life of the Virgin*, in a dedicatory inscription to Wilhelm v, Count Palatine and Duke of Bavaria. The inscription is located at the bottom of the first engraving in the series, an *Annunciation* that ‘reinvents’ and ‘restages’ the manners of various Italian masters [Fig. 6.1].<sup>2</sup> Schonaeus’s use of the term ‘repertor’ in lieu of the more common ‘inventor’ signals the uniqueness of

\* I presented previous versions of this contribution at the conferences ‘Image, Imagination and Cognition: Medieval and Early Modern Theory and Practice’ (NIAS, Wassenaar, November 2012) and ‘The World from Above: New Studies and Approaches of the World Landscape Tradition’ (Lille and Brussels, January 2013), at lectures at the Kunsthistorisches Institut Florenz (Max Planck Institute, June 2013), the Universität Hamburg, and the Eberhard Karls Universität Tübingen (June 2015). I would like to express my sincere gratitude to all the participants at these events, especially to Hannah Baader, Frank Fehrenbach, Anna Pawlak, Maurice Saß, Caroline van Eck and Michel Weemans for their stimulating comments. Most especially, my thanks go to Claudia Swan for her attentive and generous close reading of this essay.

1 ‘SERENISSIMO PRINCIPI AC ILLUSTRISSIMO DOMINO D. GUILIELMO V COMITI PALAT. RHE. UTRIUSQUE BAVARIAE DUCI. ETC. Ut mediis Proteus se transformabat in undis, | Formosae cupido Pononae captus amore: | Sic varia PRINCEPS TIBI nunc se Goltzius arte | Commutat, sculptor mirabilis, atque repertor’. On Cornelius Schonaeus, see Bloemendal J., *Spiegel van het dagelijks leven? Latijnse school en toneel in de noordelijke Nederlanden in de zestiende en de zeventiende eeuw* (Hilversum: 2003) 60–63. Schonaeus frequently wrote verses for prints by Goltzius and Karel van Mander.

2 Leeftang H. – Luijten G. (eds.), *Hendrick Goltzius (1558–1617): Drawings, Prints and Paintings*, exh. cat., Rijksmuseum, Amsterdam (Zwolle: 2003) 210–215, cat. 75; Melion W.S., ‘The Meditative Function of Hendrick Goltzius’s ‘Life of the Virgin’ of 1593–94’, in Falkenburg R. – Melion W.S. – Richardson T.M. (eds.), *Image and Imagination of the Religious Self in Late Medieval and Early Modern Europe*, Proteus 1 (Turnhout: 2007) 279–426, especially 380–381.



FIGURE 6.1 *Hendrick Goltzius, The Annunciation, first plate of The Life of the Virgin series (1594, third state). Engraving, 47.2 × 35.3 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1857,0613.451).*

IMAGE © THE BRITISH MUSEUM



Goltzius's series, which not only 'recreated' the painterly manners of Raphael (1483–1520), Parmigianino (1503–1540), Jacopo Bassano (1510–1592), and Federico Barocci (ca. 1533–1612), but also the graphic modes of Albrecht Dürer (1471–1528) and Lucas van Leyden (ca. 1494–1533).<sup>3</sup> Schonaeus was the first to compare Goltzius's virtuoso skills in assimilating various techniques, procedures, and styles in the medium of engraving to the old sea god Proteus's 'power [...] to assume many forms'.<sup>4</sup> According to Ovid, Proteus assumed the forms of a young man, a lion, a boar, a serpent, and a bull; he could appear as a rock or a tree and even take the shape of the more subtle and changeable elements water and fire. In his dedicatory verses Schonaeus invokes another Ovidian figure: the youthful god of ever-changing nature, Vertumnus, who, burning with love for the chaste Pomona, gained access to her gardens 'by means of his many disguises' ('per multas figuras').<sup>5</sup> As gods, Proteus and Vertumnus had the power and authority to change appearance according to their own desires and wishes—as suggested by Ovid's phrase 'ius est transire figuras'. Mortals, by contrast, were generally turned into highly undesirable shapes, on account of an offense, an error, or simply at the whim of a god or a goddess. In other words: Proteus and Vertumnus are among the few 'self-transformers' in Ovid's *Metamorphoses*: rather than being transformed by other gods or goddesses, they are able to change shape of their own volition.<sup>6</sup>

Proteus—associated with ever-changing water—and Vertumnus—associated with the periodically recurring seasons—embody continuous change, the governing principle of the *Metamorphoses*.<sup>7</sup> In the last book of the *Metamorphoses* Ovid has Pythagoras call Nature 'novatrix', 'the great renewer, [that] ever makes up forms from other forms'.<sup>8</sup> These same metamorphic abilities were also claimed by the Haarlem circle of humanists, to which Schonaeus and Karel van Mander (1548–1606) belonged, for the art of their younger friend Goltzius. In his *Schilder-Boeck* of 1604, Van Mander casts Goltzius as the light

3 Up to the early modern period the words 'inventor' and 'repertor' were used interchangeably to designate someone who finds, retrieves, recovers, invents, or reinvents something. See, for example, Georges H., *Ausführliches Lateinisch-Deutsches Handwörterbuch*, vol. 2 (Hannover: 1916–1919, reprint, Darmstadt: 1995) 2321–2322.

4 If not otherwise specified, I cite from Ovid, *Metamorphoses*, trans. F.J. Miller, 2 vols. (London: 1984); for Proteus: vol. 1, 456–457 (Met. VIII. 731).

5 For Vertumnus: Ovid, *Metamorphoses* vol. 2, 346–357 (Met. XIV. 652).

6 I borrow the term from Fantham E., "Sunt quibus in plures ius est transire figuras: Ovid's Self-Transformers in the 'Metamorphoses'", *The Classical World* 87 (1993) 21–36.

7 See Glinski L. von, *Simile and Identity in Ovid's Metamorphoses* (Cambridge: 2012) 115–153, especially 130–141 ('House of Sleep'); Pavlock B., *The Image of the Poet in Ovid's 'Metamorphoses'* (Madison, WI: 2009), especially 3–13 ('Introduction').

8 Ovid, *Metamorphoses* vol. 2, 382–383 (Met. XV. 252–253).

of his age and, in terms similar to those Schonaeus used in his dedicatory inscription quoted above, describes him as 'a rare Proteus or Vertumnus of art [...], who can refashion himself into all forms of manners'.<sup>9</sup> Van Mander clearly understood Goltzius's particular mode of creation not primarily as imitation or emulation of others but rather as a process of assimilation, absorption, and incorporation resulting in a transformation and the creation ('herscheping') of new appearances and shapes.

While Van Mander's comparison of Goltzius's versatile art with the shape-shifting abilities of Proteus and Vertumnus is frequently mentioned in the art historical literature, very little attention has been paid to Van Mander's reference to another Ovidian figure of imitation, deception, and change—Morpheus, the god of dreams. Philip Hardie has emphasized the significance for Ovid of Morpheus who, like the poet himself, manipulates and transforms visual appearances and shapes.<sup>10</sup> The Latin name 'Morpheus', coined by Ovid, contains the Greek word *morphē* (shape), thus playing upon the title of Ovid's work. In the eleventh book of his poem, which includes his famous description of the House and Chamber ('domus et penetralia') of Somnus or Sleep, Ovid introduces Somnus's best known son Morpheus as a 'craftsman and simulator of (human) form' ('artificem simulatoremque figurae'), thus stressing, on the one hand, Morpheus's double function as artist and actor and, on the other, the affinities between the art of poetry, the visual and performative arts, and dreams.<sup>11</sup>

9 Mander Karel van, *Het Schilder-Boeck waer in voor eerst de leerlustige Jeught den grondt der Edel Vry Schilderconst in verscheyden deelen wort voorghedraghen. Daer nae in dry deelen t'Leven der vermaerde doortuchtighe Schilders des ouden, en nieuwen tyds. Eymtlyck d'wtlegghinghe op den Metamorphoseon Pub. Ovidij Nasonis. Oock daerbeneffens wtbeeldinghe der figuren. Alles dienstich en nut den schilders, Constbeminers en dichters, oock allen staten van menschen* (Haarlem, Paschier van Westbusch: 1604) fol. 285r: 'eenen seldsamen Proteus oft Vertumnus te wesen in de Const / met hem in alle ghestalten van handelighen te connen herscheppen'. As indicated by its title, the *Schilder-Boeck* consists of a didactic poem on the theory of painting (*Den Grondt der Edel vry Schilderconst*), three *Lives* (of the Ancient, the Italian, and the Netherlandish and the northern painters), a commentary on the *Metamorphoses* of Ovid, and an instruction of how to depict the mythological figures mentioned by Ovid. Its central importance for a Netherlandish theory of art can hardly be overestimated. For an English translation of the Netherlandish *Lives* see Mander Karel van, *The Lives of the Illustrious Netherlandish and German Painters, from the First Edition of the Schilder-boeck (1603–1604)*, ed. H. Miedema, 6 vols. (Davaco: 1994–1999) vol. 1, at 398. I have occasionally modified the translation by Jacqueline Pennial-Boer and Charles Ford.

10 Hardie P., *Ovid's Poetics of Illusion* (Cambridge: 2002) 9, 16, 43, 136, 276–278.

11 Ovid, *Metamorphoses* vol. 2, 164–165 (Met. XI. 634, translation modified). See Ahl F.M., *Metaformations: Soundplay and Wordplay in Ovid and Other Classical Poets* (Ithaca, NY: 1985) 59–60; Tissol G., *The Face of Nature: Wit, Narrative, and Cosmic Origins in Ovid's*

This essay explores Karel van Mander's preoccupation with the creative workings of the imagination, personified by Morpheus, the god of dreams. In the Aristotelian tradition dream-appearances (*phantasmata*) are considered to be the work of the imagination, produced during sleep when the imagination is least controlled.<sup>12</sup> Van Mander's interest in the Ovidian imagery of sleep and dreaming played, I will argue, a significant role in the writing of the first comprehensive history and theory of northern art, the *Schilder-Boeck*. A pen-and-ink drawing featuring Ovid's House of Sleep that Van Mander executed while completing the *Schilder-Boeck* reveals the painter-poet's concern with processes of image making from the imagination, the faculty which is particularly active during dreams [Fig. 6.2].<sup>13</sup> The little-studied composition served as the preparatory drawing for the print depicting *Night* in a series of the *Four Times of Day* engraved by Jacob Matham, Goltzius's adopted son, in 1601 [Fig. 6.3]. The upper register of the composition depicts Morpheus in the

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*Metamorphoses* (Princeton, NJ: 1997) 78–82. Guillaume de Machaut, in the *Fonteinne Amoureuse* (c. 1360–62) privileges Morpheus over Pygmalion for his power to shape himself into another body: See Rosenfeld J., *Ethics and Enjoyment in Late Medieval Poetry: Love after Aristotle* (Cambridge: 2011) 89.

- 12 There is a rich literature on medieval and early modern Aristotelian views of the faculty of imagination. For a good summary, see Karnes M., *Imagination, Meditation, and Cognition in the Middle Ages* (Chicago, IL: 2011) 23–61. See also Windt J.M., "Dreams and Dreaming", in E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2016), URL: <http://plato.stanford.edu/archives/spr2016/entries/dreams-dreaming/>. And: Corcilus K., "Phantasia und Phantasie bei Aristoteles", in Brüllmann P. – Rombach U. – Wilde C. (eds.), *Imagination, Transformation und die Entstehung des Neuen*, Transformationen der Antike 31 (Berlin – Boston, MA: 2014) 71–87; Moss J., *Aristotle on the Apparent Good: Perception, Phantasia, Thought, and Desire* (Oxford: 2012) 48–68.
- 13 See Leesberg M., *Karel van Mander*, ed. H. Leeftang – C. Schuckman, *The New Hollstein Dutch & Flemish Etchings, Engravings and Woodcuts* 11 (Rotterdam: 1999) cix, cat. 34 (drawing), 179, cat. 159 (engraving); Widerkehr L., *Jacob Matham*, ed. H. Leeftang, *The New Hollstein Dutch & Flemish Etchings, Engravings and Woodcuts*, 3 vols., 50–52 (Rotterdam: 2007–2008) vol. 2, 176, cat. 226. Other brief discussions of Van Mander's drawing and/or Matham's print include: Cecchi A. – Hersant Y. – Rabbi Bernard C. (eds.), *La Renaissance et le rêve. Bosch, Véronèse, Greco...*, exh. cat., Musée du Luxembourg (Paris: 2013) 61, cat. 8 (Véronique Dalmasso); Neumeister M., *Das Nachtstück mit Kunstlicht in der niederländischen Malerei und Graphik des 16. und 17. Jahrhunderts: Ikonographische und koloristische Aspekte* (Petersberg: 2003) 127–128; Cole M., "The Demonic Arts and the Origin of the Medium", *The Art Bulletin* 84 (2002) 621–640, at 627–628; Wilson-Chevalier K., "Le songe dans l'art Bellifontain", in Charpentier F. (ed.), *Le songe à la Renaissance*, Colloque International de Cannes, 29–31 Mai 1987 (Saint-Étienne: 1990), 117–122, at 121–122; Lecoq A.-M., "L'ange peintre", in Georgel P. – Lecoq A.-M., *La peinture dans la peinture*, exh. cat., Musée des Beaux-Arts de Dijon (Dijon: 1983) 258–261; Bergot F., *Dessins de la Collection du Marquis de Robien conservé au Musée de Rennes*, exh. cat., Musée du Louvre, Cabinet des Dessins, Paris (Paris: 1972) 45–46, cat. 50.



FIGURE 6.2 Karel van Mander, *Nox* (1601). Pen and brown ink, blue wash, heightened with white on grey paper, 18.3 × 28.9 cm. Rennes, Musée des Beaux-Arts (inv. no. 794-1-2550).  
IMAGE © MUSÉE DES BEAUX-ARTS, RENNES



FIGURE 6.3 Jacob Matham after Karel van Mander, *Night*, fourth plate of *The Four Times of Day* series (ca. 1601). Engraving, 20.2 × 29.3 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1928,1212.56).

IMAGE © THE BRITISH MUSEUM

company of a great many figures, including two winged putti or, as Van Mander would have called them, 'gheesten' or 'kinderkens', spirits or children, each holding a brush and a palette.<sup>14</sup> Using both pen and brush in a rather fluid, apparently spontaneous, and effortless manner, Van Mander explored the boundaries and transitions between the visible, imagined, and dreamt worlds.

Spirits engaged in the act of painting are a rare if not unique motif in early modern dream imagery. Here, they link Van Mander's image with pivotal period reflections about artistic imagination, invention and image making 'uyt den gheest' or 'uyt zijn selven'—from the imagination, from oneself—as Van Mander termed it. Van Mander introduced the phrases 'uyt den gheest' and 'naer het leven' (after life) into art theory in the *Schilder-Boeck* of 1604, where they denote closely interconnected modes of imitation and invention.<sup>15</sup> In the chapter of *Den Grondt der Edel vry Schilder-const* (*The Foundation of the Noble Free Art of Painting*, the first book of the *Schilder-Boeck*) on landscape Van Mander associates leaves, hair, air, and fabric with the realm of 'gheest' or spirit. Because of their fleeting and volatile quality, they need to be depicted 'uyt den gheest' rather than 'naer het leven'. To achieve this a good brushstroke ('eenen schoonen slach') is essential, and this type of brushwork cannot be learned through practice alone, like 'exercising the muscles of the body'.<sup>16</sup> Leaves, hair, air, and fabric are all 'gheest', and 'gheest' alone teaches how to make and create them.<sup>17</sup> 'Gheest' is here understood as 'schilder-gheest' or innate talent given to the soul at birth, as will be further explained below. Dreams, too, construed as subtle and fugitive appearances, require picturing from the mind or 'from the

14 For the semantic field of 'kinderkens', see below, note 45.

15 The two modes of artistic practice are explicitly addressed in Van Mander's life of the Antwerp-born painter Jacques de Gheyn II (1565–1626): Mander, *Schilder-Boeck* fol. 294r–v: 'Bestaende dan ernstigh te practiseren / bevondt seer noodigh / veel nae t'leven / en met eenen uyt den gheest te doen / om alsoo alle alle redenen der Const te leeren verstaen'.— 'Now that he had the intention to practice seriously, he found that it was very necessary, to do much from life, and some from the imagination, so as to learn to understand all the rules of art'. For an interpretation of this passage, see Swan C., "Ad vivum, naer het leven, From the Life: Defining a Mode of Representation", *Word & Image* 11 (1995) 353–373, at 355.

16 Mander, *Schilder-Boeck* fol. 37r, stanza 37, marginal note: 'Te soecken eenen schoonen slach van bladen. Bladen, hayr, locht, en laken, quaet te leeren, wesende een gheestich dinghen'.— 'One should seek a good brushstroke [to depict] leaves. Leaves, hair, air, and fabric, difficult to learn, are all spiritual things'.

17 Mander, *Schilder-Boeck* fol. 37r–v, stanza 37: 'Doch / ten schijnt niet alst bemuysde lichame | Leersaem Const: want bladen / hayr / locht / en laken / | Dat is al gheest / en den gheest leert het maken'. See also Melion W.S., *Shaping the Netherlandish Canon: Karel van Mander's Schilder-Boeck* (Chicago, IL – London: 1991) 65–66.

imagination', where the creative and transformative power of the artist is most challenged.

### Cloudscapes

Van Mander's drawing in the Musée des Beaux-Arts in Rennes is the only extant preparatory sketch for Matham's engraved series featuring the four times of day. Simon Sovius (1547–1625), a Catholic priest in the Haarlem circle of Van Mander, contributed the inscriptions. Jacob Matham's engraving *Nox* (*Night*), the last sheet in the series, identifies Morpheus as the ruler of that time [Fig. 6.3]. The first engraving in the series is entitled *Aurora* (*Dawn*) and features the goddess of the morning red with the winged poet's horse 'rising itself';<sup>18</sup> it includes the imperial privilege granted to Matham by Emperor Rudolf II for an unlimited period of time in March 1601 [Fig. 6.4].<sup>19</sup> The second engraving, *Meridies* (*Midday*), shows Phoebus-Apollo with his chariot, 'driving away the mists and bringing back the pleasant light to the world' [Fig. 6.5].<sup>20</sup> The third engraving, *Vesper* (*Evening*), depicts Venus and Cupid and, below them, a banquet scene [Fig. 6.6].<sup>21</sup> That the series was conceived by Karel van Mander and Jacob Matham in honour of Holy Roman Emperor Rudolf II, whom Van Mander calls 'currently the greatest lover of painting in the world' ('den teghenwoordigen meesten Schilder-const-beminder der

18 The inscription reads: 'Rosida quum primum pulsas AURORA tenebris | Prodyt, et roseo perfudit lumine terras, | Multiplices doct[ae] tractant Heliconis alumn[ae] | Artes, Pegasias potant et largius undas'.—'The moment the pink Dawn has chased away the darkness and rises itself, the learned children of Helicon take up their many arts and drink plentifully from Pegasus's water'. Here and in the following I cite from the translation in Leesberg, *Karel van Mander*, lxxxii–lxxxiii, cat. 156–159.

19 See Leesberg, *Karel van Mander*, cat. 156; Widerkehr, *Jacob Matham* vol. 2, 175, cat. 223.

20 The inscription reads: 'Igneus auricomum PHAEBUS caput exerit alto | Aethere, discutiens nebulas, gratamque reducit | Lucem orbi, statasque diem partitur in horas, | Ad sultos revocans mortales quosque labores'.—'Fiery Phoebus sticks out his head with golden hair from the high heaven, drives away the mists and brings back the pleasant light to the world; he divides the day into fixed hours and calls upon all mortals to take up their normal work'.

21 The inscription reads: 'Candida dum solitum percurrit Cynthia callem, | Et niveos frenans cervos per inania fertur, | Nuncius interea noctis micat Hesperus, atque | Diva VENUS gaudet thalamis, et suadet amores'.—'When the pale Cynthia traces her regular orbit and with her bridled white horses courses through space, the messenger of the night Hesperus shines in the meantime and the goddess Venus is pleased with the marital bed and furthers amorous adventures'.





FIGURE 6.4 Jacob Matham after Karel van Mander, *Aurora*, first plate of *The Four Times of Day* series (1601). Engraving, 20 × 29.1 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1928,1212.53).

IMAGE © THE BRITISH MUSEUM



FIGURE 6.5 Jacob Matham after Karel van Mander, *Meridies*, second plate of *The Four Times of Day* series (1601). Engraving, 20.1 × 29.1 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1928,1212.54).

IMAGE © THE BRITISH MUSEUM



FIGURE 6.6 *Jacob Matham after Karel van Mander, Vesper, third plate of The Four Times of Day series (1601). Engraving, 20 × 29 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1928,1212.55).*

IMAGE © THE BRITISH MUSEUM

Weerelt'), seems highly probable. While admitting that a stay in Rome with its many ancient monuments was indispensable for any aspiring artist in order to learn to draw, Van Mander maintained that those who desired to see something new should undertake the journey to Prague, the seat of Rudolf II's court, and study the works of contemporary artists, especially Netherlandish ones, in princely *constcamers*.<sup>22</sup> The poetic imagery that pervades the whole series of prints relates it to a space such as the Prague *constcamer* in which new (Netherlandish) art was displayed and discussed.

Series of the times of day preceding the set by Van Mander and Matham also combine mythological and allegorical figures with scenes of daily life. Of these, the series designed by the Amsterdam painter Dirk Barendsz. (1534–1592) and engraved and published by Jan Sadeler the Elder (1550–1600) in Cologne in 1582 is the most interesting. Particularly innovative is Barendsz.'s image of night depicting a nude man who, overcome by sleep, rests his muscular body against the entrance of a dark cave illuminated by an oil lamp and watched by two

22 Mander, *Schilder-Boeck* fol. \*4v ('Voor-reden').





FIGURE 6.7 Johann Sadeler I after Dirck Barendsz., Nox, fourth plate of *The Four Times of Day* series (1582). Engraving, 18.2 × 22.9 cm. Amsterdam, Rijksmuseum (inv. no. RP-P-oB-7456).

IMAGE © RIJKSMUSEUM

owls; nearby fly two bats [Fig. 6.7].<sup>23</sup> The overturned pitcher next to the sleeper and the rat crouching at his side suggest that night is an ambivalent and disquieting time. As mentioned in the inscription, it ‘often supplies the torch to ill deeds’ and ‘has its own games, delights, and pleasures’—as illustrated by the musicians and revellers in the background.<sup>24</sup> The ‘heroic’ nudity of the sleeper and the fact that he sleeps at the entrance of a cave suggest that this figure also represents the god of sleep. The thick clouds of fog that the inebriated sleeper breathes into the night air refer both to the physiological processes of sleep

23 Judson J.R., *Dirck Barendsz., 1534–1592* (Amsterdam: 1970) 147–149, cat. 101. See also Cecchi – Hersant – Rabbi-Bernard, *La Renaissance et le rêve* 60, cat. 7 (Carlo Cinelli); Neumeister, *Das Nachtstück mit Kunstlicht* 98–100; Borchhardt-Birbaumer B., *Imago noctis: Die Nacht in der Kunst des Abendlandes* (Vienna – Cologne – Weimar: 2003) 452–453.

24 I cite from Judson, *Dirck Barendsz.* 148.



FIGURE 6.8 Adriaen Collaert after Maarten de Vos, *Nox* (before 1597). Engraving, 20.5 × 26 cm. London, The British Museum, Dept. Prints & Drawings (inv. no. 1901,0611.81).

IMAGE © THE BRITISH MUSEUM

and to contemporary views about the nocturnal world. Barendsz. receives special attention in Van Mander's *Schilder-Boeck*, which praises him for having brought 'the right manner from Italy to the Netherlands pure and unmixed'.<sup>25</sup> It does not therefore come as a surprise that Van Mander adopted Barendsz.'s motif of the fog emanating from the sleeper for his own rendering of the god of sleep.

Van Mander must also have known Maarten de Vos's 1597 *Times of Day* series, which introduces the respective gods and goddesses as gigantic figures separated off by banks of clouds [Fig. 6.8].<sup>26</sup> However, a comparison of the Van Mander and De Vos compositions representing night clearly shows the extent to which Van Mander's *Night*, with its complex fusion of real, fictional and

25 Mander, *Schilder-Boeck* fol. 259r: '[...] die in Nederlandt de rechte manier van Italien heeft puer en onvermengt ghebracht'.

26 Neumeister, *Das Nachtstück mit Kunstlicht* 100.

imagined worlds, differs from established iconographic conventions. Whereas Maarten de Vos's *Night* features Somnus, the aged god of sleep, slumbering on a cloud under a starry sky with his head propped up on one hand, Van Mander's *Night* presents Morpheus, the god of dreams—the master artificer among Somnus's one thousand sons—pouring 'either true or false dreams ('vel vera vel vana insomnia') into the minds' of the sleepers, according to the inscription. Compared to Morpheus, the god Somnus himself, lying in his dark cavern, is rather small.

Let us now take a closer look at Van Mander's drawing [Fig. 6.2]. Fog, smoke, vapours, and fumes—the subtle bodies from which dreams and inner representations (both called *phantasmata*) were made—dominate the composition. In fact, the imagery of vapours and fumes indicates both the airy, volatile, highly refined and subtle quality of 'spirits' as distinct from ordinary matter and the liminal place of 'subtle bodies' at the threshold of the incorporeal and immaterial realms, at the very edge of the visible, perceptible, and tangible. The world of sleep and dreaming is here presented as a cloudscape or, rather, a smokescape containing an array of figures. The thick wafts of mist emanating from the head of the god of sleep and pervading the composition take up motifs and compositional strategies frequently employed in engraved series representing the times of day and other cosmological themes.<sup>27</sup> Clouds, as has been suggested by Hubert Damisch and Victor I. Stoichita, separate the divine from the earthly realms.<sup>28</sup> In Van Mander's drawing, the clouds function both as a separating and a linking element between the outside world and the world within, between the natural world and the world of poetic imagination. In the *Schilder-Boeck*, Van Mander recommends to aspiring painters that they look at ever-changing clouds in order to study the most subtle parts of painting, the reflection of colour and light. He begins the central seventh chapter *Van de Reflecty / Reverberaty / teghen-glans oft weerschijn* (*On Reflection, Reverberation, and Reflected Luster or Shine*) in *Den Grondt* with a graphic description of how clouds take on a variety of colours at different times of the day.<sup>29</sup> Van Mander further invokes the old argument that clouds stimulate the imagination to see

27 Shamos G., *Bodies of Knowledge: The Presentation of Personified Figures in Engraved Allegorical Series Produced in the Netherlands, 1548–1600*, Ph.D. dissertation (University of Pennsylvania: 2015) 124–194.

28 Stoichita V.I., *Visionary Experience in the Golden Age of Spanish Art* (London: 1995) 84–102; Damisch H., *A Theory of Cloud: Toward a History of Painting* (Stanford, CA: 2002).

29 Mander, *Schilder-Boeck* fol. 29r–v (stanza 1–9).

various figures and shapes, and refers to their increasing and decreasing in size depending on the thickness of the clouds of which they are formed.<sup>30</sup>

In the background of the drawing a procession of revellers, led by two torch-bearers, moves through a stately building. A similar motif had already been used by both Dirk Barendsz. and Maarten de Vos [Figs. 6.5, 6.6]. However, in Van Mander's composition, the 'real' architecture is obscured on the right by a rocky outcropping that contains the cave or cavern of the god of sleep. In front of this cave a number of sleepers lie on bare rocks. To the left of the unequal couple (an old man with a young woman) at the center a male figure, ostensibly in an auspicious state between dreaming and waking, directs his attention to the procession of night revellers, thus linking the liminal spaces of dreams and nightly revelleries. Van Mander's 'house' or 'chamber of sleep' is largely based on Ovid's description.<sup>31</sup> From the ground, Ovid says, rise 'clouds of vapour' ('nebulae caligine mixtae') and 'dusky twilight shadows' ('dubiaeque crepuscula lucis'). Van Mander shows Somnus at the mouth of the cave as an old man with a beard, stretched out on soft cushions, surrounded by his many children, the 'empty dream-shapes, mimicking many forms' ('varias imitantia formas somnia vana'). Ovid also mentions innumerable sleep-inducing herbs and a wealth of poppies.

### The Children of Sleep

The vapours rising from Somnus's head coalesce into thick clouds, one of which serves his most famous son, Morpheus, the god of dreams, as a resting place. Van Mander depicts him as a youthful figure with large wings, elegantly reclining on his cloudy bed. By moving his smoke producing instruments—an elephant tusk and a curved horn of plenty—above the sleepers beneath him he is clouding their minds with dreams. What is the broader intellectual and cultural context of Van Mander's imagery of sleep and dreams? For this and other mythological depictions, Van Mander's own text, the *Wtlegghingh op den Metamorphosis Pub. Ovidij Nasonis* (*Interpretation of the Metamorphoses of Ovid*), the fifth book of the *Schilder-Boeck*, is a vibrant, pertinent resource. Though he does not reveal his source in the *Wtlegghingh*, for his depiction of the figure of Morpheus Van Mander consulted either Vincenzo Cartari's

30 Mander, *Schilder-Boeck* fol. 29v (chapter 7, stanza 9): 'Coleuren en Beelden menighertiere | Sietmen in de wolcken / die hen vermeeren // Oft verminderen / diveersch van maniere // Nae dat hen de matery van den viere //'.  
31 In the following I cite from Ovid, *Metamorphoses* vol. 2, 162–164 (Met. XI. 592–515).

*Le imagini con la spositione de i dei de gliantichi* (Venice, 1556) or perhaps Cesare Ripa's *Iconologia*—a reference book 'about how to form and explain symbolic concepts', first published in Rome in 1593 and, in an expanded, illustrated edition in 1603. Expanding on Cartari, Ripa mentions the vapours and spirits that perform vital functions in man in his emblem of sleep. According to Ripa, 'sonno' (sleep) can be represented both as an old and corpulent man and as a young one 'with wings on his shoulders, holding in his right hand a cornucopia from which vapour rises'. The horn of plenty 'demonstrates that sleep is caused by vapours which, rising to the brain, change it and by that means disperse', while 'the wings and his young age show the swiftness of sleep and the delight of the hours spent sleeping'.<sup>32</sup>

According to Cartari Somnus should be represented holding both a horn of plenty and an elephant tusk, out of which true and false dreams emerge respectively.<sup>33</sup> Van Mander's drawing, however, conflates Morpheus with the young, winged figure of Somnus described by Cartari and Ripa. Morpheus's two horns are also mentioned in the print's inscription by Sovius. It reads: 'Morpheus, whose father is Somnus, carries two horns, from which in the dark night he pours either true or false dreams into people's minds, which reproduce countless apparitions of all sorts of things'.<sup>34</sup> The terms used by Sovius deserve a closer look. According to Aristotle, *phantasmata* are products of the imagination, created at the juncture of the physical and psychological realms.<sup>35</sup> Considered mental sense-images, dreams came to occupy an important place

32 I am quoting from Ripa Cesare, *Iconologia overo Descrittione di diverse imagini cavate dall'antichità* (Rome, Lepido Facii: 1603) 464–465: 'Un Giovane con l'ali alle spalle, che con la destra mano tenghi un Cornucopia, onde esca fumo [...] Il Cornucopia, di cui esce il fumo, dimostra la cagione del sonno essere i vapori, i quali, salendo alla testa, lo cangiano, & e per mezzo di esso si risolvano [...] L'ali, & l'età giovanile, dimostrano la velocità del sonno, & la piacevolezza dell'hore, che dormendo si spendono'.

33 Cartari Vincenzo, *Le imagini con la spositione de i dei de gliantichi* (Venice, Francesco Marcolini: 1556) fol. LXVv. Already Homer, in the *Odyssey*, equipped the 'shores of dream' (demos oneirōn) with gates of horn (for true dreams) and ivory (for false dreams). See Cox Miller P., *Dreams in Late Antiquity: Studies in the Imagination of a Culture* (Princeton, NJ: 1994) 14–15.

34 'Cui pater est Somnus, MORPHEUS duo cornua gestat,| E quibus in mentes hominum vel vera subinde,| Vel vana immittit per c[ae]cam insomnia noctem,| Omnigenum referens phantasmata plurima rerum'. I modify the translation in Leesberg, *Karel van Mander* lxxxiii.

35 For a helpful summary of Aristotle's theory of *phantasmata*, see Cox Miller, *Dreams in Late Antiquity* 43–44.

in sixteenth-century philosophical and medical texts, due to their contrived and artful quality. *Insomnia* and *phantasmata* were generally viewed as illusory and untrustworthy dreams, as, for example, in Macrobius's five-fold classification of dreams, also cited by Giovanni Boccaccio in the *Genealogia deorum* (1350–1374), which remained influential until well into the early modern period. According to Macrobius, *insomnia* were summoned by 'mental or physical distress, or anxiety about the future'.<sup>36</sup> A slightly higher status was assigned to the *visa*, also called *phantasiae* or *phantasmata* in subsequent treatises, which appeared while dozing or in a state between sleeping and waking and were considered the effects of the imagination; these *phantasmata* might also lead to understanding and knowledge.<sup>37</sup> Still greater value was accorded to *somnia*, a term Macrobius applied to those dreams which 'conceal with shapes and veil with ambiguity the true meaning of the information being offered' ('tegit figuris et velat ambagibus'), and thus require interpretation.<sup>38</sup> The inferior kinds of dreams in particular were generally linked to the process of digestion. Van Mander discusses the physiological understanding of dreams toward the end of his commentary *Van den Slaep-Godt / en den Droomen* (On the God of Sleep and on Dreams) in Chapter Eleven of the *Wtlegghingh*.<sup>39</sup> But *insomnia*, *phantasiae*, *phantasmata*, and *somnia* also designated the dream fictions generated by the poetic imagination in dreams. Recall the composite figures described by Horace as 'vanae species' ('worthless images') and 'aegri somnia' ('dreams of a sick man') in the famous opening of the *Ars Poetica*, a text regularly invoked in the early modern era in support of painters' claim for artistic licence.<sup>40</sup>

Beginning in the later Middle Ages, dream theory and literary theory were closely associated.<sup>41</sup> As Maria Ruvoldt and others have shown, intellectual circles around Michelangelo, adapted the longstanding poetic tradition

36 I quote from Kruger S.F., *Dreaming in the Middle Ages* (Cambridge: 1992) 21–22. For Boccaccio's discussion of Macrobius's five types of dreams (*phantasma*, *insomnia*, *somnia*, *visiones*, *oracula*) see Boccaccio Giovanni, *Genealogy of the Pagan Gods* [*Genealogia deorum*, English & Latin], ed. and trans. J. Solomon, vol. 1, *The I Tatti Renaissance Library* 46 (London: 2011) 154–161 (book 1, chapter 31).

37 Kruger, *Dreaming in the Middle Ages* 22–23.

38 Kruger, *Dreaming in the Middle Ages* 23.

39 Mander, *Schilder-Boeck* (*Wtlegghingh*) fol. 98r.

40 Horace, *Ars poetica*, lines 7–8: 'velut aegri somnia, vane fingentur species'. On the Renaissance reading of Horace as an argument in favour of artistic license, see Summers D., *Michelangelo and the Language of Art* (Princeton, NJ: 1981) 128–134. For a recent study: Swan C., "Counterfeit Chimeras: Early Modern Theories of the Imagination and the Work of Art", in Payne A. (ed.), *Visions and its Instruments* (University Park, PA: 2015) 216–237.

41 Kruger, *Dreaming in the Middle Ages* 123–149.

emphasizing the affinities between the work of the imagination in dreams and in artistic invention and creation, and between the images or *phantasmata* produced by the artist's fantasy and those that arise in dreams.<sup>42</sup> Van Mander paid tribute to but also distinguished himself from the Italian tradition. As already mentioned, in Van Mander's composition, four-winged putti or 'spir- itelli' armed with brush and palette are busy applying colour to the *somnia* (or *insomnia*) and *phantasmata*, thus ostensibly animating a lion, a castle and a city wall. The hide held up by two putti behind the one who is colouring the animal could refer to the Golden Fleece, to which Van Mander's *Schilder-Boeck* attributes particular significance because of its precious material and alchemical associations.<sup>43</sup> Next to the lion we see two of those composite figures to which imagination gives birth in dreams or in a state of semi-consciousness— hybrid creatures or chimeras. The fact that these are fleeting apparitions is underscored by the putti's various activities. One putto, armed with shield and sword, is fighting clouds, and two others are blowing bubbles. The city wall or fortress another putto paints may refer to the walls built around the City of Dreams, which Lucian describes as 'high and gaily painted the colours of a rainbow'.<sup>44</sup>

In his life of Perino del Vaga Van Mander, expanding on Giorgio Vasari, refers to 'small histories and figures, masks, children, animals, and other phantasies' as 'grotesques' ('grotissen'), for which 'great inventive talent' ('grooter inventie') was needed.<sup>45</sup> The clouds in the upper part of Van Mander's composition are

42 Ruvoldt M., *The Italian Renaissance Imagery of Inspiration: Metaphors of Sex, Sleep, and Dreams* (Cambridge: 2004); Ruvoldt M., "Michelangelo's Dream", *The Art Bulletin* 85 (2003) 86–113.

43 Van Mander identifies the Golden Fleece with the Philosopher's Stone in his commentary 'On Jason' in the seventh book of the *Wtlegghingh* fol. 62r, marginal note: 'Gulden Vlies op d'Alchemie uytgeleyt': 'Daer zijn noch ander meeningen van t'gulde Vlies natuerlijcker wijze / dat eenighe meenen / dat al den arbeydt by Iason, op zijn Vlies-reyse geschiedt / niet is als t'veranderen der lichamen der stoffen / die men ghebruyckt in de Chemie / en dat dit gulden Vlies te krijen / is den Philosooph-steen'.

44 I cite from Cox Miller, *Dreams in Late Antiquity* 27.

45 Mander, *Schilder-Boeck* fol. 141r: '[...] zijn van hem gedaen grotissen / cleen historikens en figuerkens / masscheren / kinderkens / dieren / en ander fantasijen / alles seer aerdich [...] Ten is niet te bedencken / wat overvloet en gracelijckheyt hier te sien is / van beeldekens / bladerkens / dierkens / en grotiskens / gedaen met grooter inventie'. Cf. Vasari Giorgio, *Le vite de' più eccellenti pittori scultori e architettori nelle redazioni del 1550 e 1568*, ed. P. Barocchi – R. Bettarini, 6 vols. (Florence: 1966–1987) vol. 5, 138: 'il più bello e ricco ornamento di grotteschine all'antica, con varie storie e figurine piccole, maschere, putti, animali, ed altre fantasie fatte con quella invenzione e giudizio che solevano esser le cose sue, che in questo genere veramente si possono chiamare divine'.



formed from vapours emanating from the head of the god of sleep. The processes pictured here may thus be taking place in a dreamer's mind, perhaps in the imagination of the dozing figure looking into the picture, who may serve as a stand-in for the viewer and the draughtsman or painter. Morpheus with his inexhaustible horns of plenty represents the superabundance of wit or spirit (*gheest*) or, rather, the superabundance of 'painter's wit' or 'artful painter's wit' ('schilder-gheest' or 'constigen schilder-gheest'). Van Mander understood 'gheest' or 'schilder-gheest' as a fluid or subtle force, granted to the painter's soul at birth. *Schilder-gheest* is 'drawn in and swallowed with the enjoyment of the first breath'.<sup>46</sup> The words 'fanciulli', 'amorini', and 'spiritelli'—or their Dutch equivalents, 'gheesten' or 'kinderkens'—had been applied since the fifteenth century to putti who, because of their agility and swiftly changing emotions, were connected with the *ingenium* (the natural gift, the inborn talent) of the poet or artist.<sup>47</sup> Of an equally subtle consistency as the vapour and smoke of which dreams are made, Van Mander's notion of 'schilder-gheest' joins the spirits of ingenuity and the imagination, thereby situating the process of image making at the boundary between the visible, imagined, and dreamt worlds.

### The Artifice of Dreams

By the prominent placement of 'spiritelli' or dreams shown in the act of painting, Van Mander was responding to well-known Italian imagery of sleep and dreams—which, however, emphasized Morpheus's skills in histrionic imitation and deception. One of the most widely known iconographies of the House of Sleep is found in Annibale Caro's programme for the Camera dell' Aurora, the bedroom of Cardinal Alessandro Farnese (1520–1589) in his summer residence at Caprarola, which is cited in detail in the second edition of Vasari's *Vite* of 1568.<sup>48</sup> Caro suggested Ovid's House of Sleep for the pendentive directly above the Cardinal's bed, and explicitly asked that Morpheus be shown 'in the act of making masks of various appearances', since Ovid had called him 'the

46 The relevant passage is: Van Mander, *Schilder-Boeck* fol. \*5v: '[...] die in't ghenieten van der eerster Locht uyt soo goede gesterten hebben ghesoghen / oft ingheslorpt een gantsche toegheneghenthey / in onse Schilder-const behendigh te wesen'.

47 For the Renaissance understanding of *spiritello*, *amorino* and *fanciullo*, see Dempsey C., *Inventing the Renaissance Putto* (Chapel Hill, NC – London: 2001) 13–16, and *passim*.

48 For an excellent study see Robertson C., "Annibal Caro as Iconographer: Sources and Method", *Journal of the Warburg and Courtauld Institutes* 45 (1982) 160–181.



artificer and maker of figures'.<sup>49</sup> Taddeo Zuccaro adhered closely to the programme devised by Caro, depicting the god of sleep 'as a young man of perfect beauty with wings' holding a wand in one hand and three poppy heads in the other.<sup>50</sup> In addition to Morpheus, he depicted Icelus transforming himself into many animal shapes and Phantasus transforming himself into various inanimate things.<sup>51</sup> As at Caprarola, masks are also an important motif in what is arguably the most famous dream image of the sixteenth century, Michelangelo's *Sogno*, created between 1535 and 1540 and most probably presented by the artist to Tommaso de' Cavalieri.<sup>52</sup> Michelangelo's drawing was known in the Netherlands through printed and painted copies; a late sixteenth-century copy or, rather, a religious and moral reinterpretation painted on slate, is listed in the 1659 inventory of the collection of Archduke Leopold Wilhelm, Governor of the Spanish Netherlands [Fig. 6.9].<sup>53</sup> Interestingly, Zuccaro's drawing for the fresco at Caprarola identifies Morpheus as sculptor: although he is shown forming the mask with his hands, using clay rather than stone, a hammer and chisel are placed next to him [Fig. 6.10].<sup>54</sup> In Van Mander's House of Sleep, the roles of the inhabitants are defined differently and Somnus's sons, rather than sculpting masks, are engaged in other activities, including painting.

49 Vasari, *Le vite* vol. 5, 583: 'Morfeo è chiamato da Ovidio artefice e fingitore di figure, e però lo farei in atto di figurare maschere di variati mostacci, ponendone alcume di esse a' piedi'.

50 Vasari, *Le vite* vol. 5, 583: 'In questo [letto] sia collocato il Sonno, un giovane di tutta bellezza, [...] con l'ali in su gl'omeri [...] D'intorno al suo letto si vegga Morfeo, Icalo e Fantaso, e gran quantità di Sogni, che tutti questi sono suoi figliuoli'.

51 Vasari, *Le vite* vol. 5, 583: 'Icalo dicano che si trasforma esso stesso in più forme, e questo figurerei per modo che nel tutto paresse uomo et avesse parti di fiera, di uccello, di serpente, come Ovidio medesimo lo describe. Fantaso vogliano che si trasmuti in diverse cose insensate, e questo si puole rappresentare ancora, con le parole di Ovidio, parte di sasso, parte d'acqua, parte di legno'.

52 Recent studies of this complex drawing include: Buck S., with the assistance of Bissolati T. (ed.), *Michelangelo's Dream*, exh. cat., The Courtauld Gallery (London: 2010); Ruvoldt, *The Italian Renaissance Imagery of Inspiration* 141–187; Ruvoldt, "Michelangelo's Dream".

53 Ferino-Pagden S. (ed.), *Vittoria Colonna: Dichterin und Muse Michelangelos*, exh. cat., Kunsthistorisches Museum Wien (Vienna: 1997) 331–334, cat. IV. 10 (W. Prohaska); Göttler C. – Schaffer A., "Die Kunst der Sünde: Die Wüste, der Teufel, der Maler, die Frau, die Imagination", in F. Eggelhöfer, *Lust und Laster: Die 7 Todsünden von Dürer bis Nauman*, exh. cat., Kunstmuseum Bern and Zentrum Paul Klee, Bern (Ostfildern: 2010) 42–61, at 47; Buck S., "The Dream Goes On: Copies after the *Sogno*", in Buck, *Michelangelo's Dream*, 48–65, at 61–62.

54 Ruvoldt, *The Italian Renaissance Imagery of Inspiration* 177; Cecchi – Hersant – Rabbi-Bernard, *La Renaissance et le rêve* 150, cat. 71 (L. Capodieci).



FIGURE 6.9 Italian artist after Michelangelo Buonarroti, *Il sogno* (third quarter of the sixteenth century). Oil on slate, 59 × 47 cm. Vienna, Kunsthistorisches Museum, Gemäldegalerie (inv. no. 186).

IMAGE © KUNSTHISTORISCHES MUSEUM



FIGURE 6.10 Taddeo Zuccaro, *The Cave of Somnus*. Pen and brown ink, washed, 27.1 × 27.1 cm. Paris, Musée du Louvre, Département des Arts graphiques (inv. no. 10481).

IMAGE © MUSÉE DU LOUVRE

In the Italian literature on art certain Flemish paintings, most notably the works of Hieronymus Bosch and his followers, are regularly called ‘dreams’ (‘sogni’). In the second edition of the *Vite* of 1568, Vasari lists ‘landscapes in oil, fantasies, bizarre inventions, dreams, and imaginations’ among the subjects in which Netherlandish painters such as Hieronymus Bosch and Pieter Bruegel the Elder (‘the second Hieronymus Bosch’) excelled.<sup>55</sup> Vasari’s list

55 Vasari, *Le vite* vol. 6, 225 ‘[...] e Francesco Mostaret, che valse assai in fare paesi a olio, fantasticherie, bizzarrie, sogni et imaginationsi. Girolamo Hertoglien Bos e Pietro Bruveghel di Breda furono imitatori di costui [...]’. Vasari erroneously views Bosch and Pieter Bruegel as ‘imitators’ of Frans Mostaert. For an expanded interpretation of this passage

appears to associate 'sogni' with 'fantasticherie', 'bizzarie' and 'immaginazioni'. Giovan Paolo Lomazzo, in his turn, considers 'grotteschi' as products of an inspired mind and uses them synonymously with 'grilli, chimere, caprizzi' and 'bizzarie'.<sup>56</sup> That Vasari based his judgment about Flemish art in the manner of Hieronymus Bosch upon earlier traditions is suggested by Marcantonio Michiel's 1521 description of one of Bosch's paintings, which he had seen in the collection of Cardinal Antonio Grimani in Venice, and which he called 'la tela delli sogni' ('the painting of dreams').<sup>57</sup>

Published in 1572 (four years after the second edition of Vasari's *Vite*), Hieronymus Cock's engraved series of the *Pictorum aliquot celebrium Germaniae inferioris effigies* (*Effigies of Some Celebrated Artists of the Low Countries*) underscores the prominent role of Bosch's dreams ('sogni') in the construction of a Netherlandish canon of art. In a letter sent to Vasari in October 1564 Dominique Lampson, who wrote the verses that accompany the portraits in the *Effigies*, emphasized the skill and practice needed for the depiction of what he calls 'more uncertain things' such as 'landscapes, trees, waters, clouds, splendours, fires'.<sup>58</sup> Lampson's verses beneath Bosch's portrait imaginatively recreate the effects of Bosch's ability to see into 'the lowest hollows of the underworld', both upon the artist's own bodily sensations—he looks frightened and his face turns pale—and, through a process of visual contagion, the viewer's emotions.<sup>59</sup> The hidden recesses recorded by Bosch's hand reference both the subterranean spaces of the kingdom of death (or sleep)

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see Göttler C., "Wit in Painting, Color in Words: Gillis Mostaert's Depictions of Fires", in Göttler C. – Ramakers B. – Woodall J. (eds.), *Trading Values in Early Modern Antwerp*, Netherlands Yearbook for History of Art 64 (2014) 214–246, at 218–220; Göttler C., *Last Things: Art and the Religious Imagination in the Age of Reform* (Turnhout: 2010) 335–376.

56 Lomazzo Giovan Paolo, *Rime ad imitazione de i grotteschi usati da' pittori*, ed. A. Ruffino (Rome: 2006) 504: 'Libro sesto. Nel quale si contengono varii grilli, chimere, caprizzi, bizzarie, sotto metafore, sì come da studiosi ingegni s'intenderà'. For Lomazzo's high regard of 'grotteschi' as artistic products emerging from an inspired and creative mind, see Summers, *Michelangelo and the Language of Art* 62.

57 Gibson W.S., "Bosch's Dreams: A Response to the Art of Bosch in the Sixteenth Century", *The Art Bulletin* 74 (1992) 205–18, at 205. Cf. *Der Anonimo Morelliano* (Marcantonio Michiel's *Notizia d'opere del disegno*, trans. T. von Frimmel (Vienna: 1896) 102–103.

58 Vasari, *Le vite* vol. 6, 228: '[...] dipigner cose più incerte che ricercano la mano più esercitata e sicura, quali sono paesaggi, alberi, acque, nuvole, splendori, fuoc[h]i'.

59 'What is meant by that astonished eye of yours, Hieronymus Bosch, or that pallor in your face? As if you had seen ghosts, the specters of Erebus, flittering in front of you. I could believe that the caves of greedy Pluto and the houses of Tartarus lay open to you, seeing as your hand could paint so well whatever the lowest hollows of Avernus contain'. I cite the English translation by Daniel Hadas in Woodall J. – Porras S., *Picturing the Netherlandish*

and the interior spaces of the artist's mind; the interior faculties, especially memory, from which the imagination selects and re-combines things, were frequently compared to a vast and unruly landscape scattered with grottoes and caves. In 1567 Lodovico Guicciardini had already called Pieter Bruegel a 'grande imitatore della scienza, & fantasie di Girolamo Bosco',<sup>60</sup> while, in the verses beneath Bruegel's portrait, Lampson suggests that Bruegel sometimes even surpassed Bosch in the depiction of 'ingenious dreams' ('somnia ingeniosa').<sup>61</sup> Guicciardini's parallel placement of the terms 'scienza' and 'fantasie'—as the products of the faculty of the imagination—and Lampson's designation of dreams as ingenious and inspirational point to the high regard for Bosch's and Bruegel's visual vocabulary in the theory of northern art. Interestingly, while Vasari later credited Dürer with 'belle fantasie et invenzioni', Dürer himself was dubious and ambivalent in regard to inventions not taken from nature, as his use of the notion of 'traumwerck' (dream work) suggests.<sup>62</sup>

### 'Climbing Down into the Deep Cave': The Space and Site of the Imagination

Van Mander mentions Morpheus twice in the *Schilder-Boeck*: in Chapter Six, *Wtbeeldinghe der Affecten / passien / begeerlijckheden, en lijdens der Menschen* (*Depiction of Human Affects, Passions, Desires, and Sorrows*) of *Den Grondt*, the didactic poem on the theory of painting which introduces the *Schilder-Boeck*; and, as already mentioned, in Chapter Eleven of the *Wtleghghingh*. The *Wtleghghingh* has been little studied, despite the fact that Van Mander designed

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*Canon* (London: 2011): <http://www.courtauld.org.uk/netherlandishcanon/image-tombstone/07.html> (accessed: 08.02.2015).

60 Guicciardini Lodovico, *Descrittione di tutti i Paesi Bassi, altrimenti detti Germania inferiore* (Antwerp, Guglielmo Silvio: 1567) 100.

61 Van Mander translates the phrase 'somnia ingeniosa' as 'cloecke droomen' (clever dreams); Mander, *Schilder-Boeck* fol. 234r.

62 For Dürer's ambivalent position toward the workings of the imagination, see Parshall P., "Graphic Knowledge: Albrecht Dürer and the Imagination", *The Art Bulletin* 95 (2013) 393–410, at 395: 'Doch hüt sich ein yedlicher das er nichtz vnmüglichs mach das die natur nit leyden kun / es wer dann sach das einer traumwerck wolt machen / inn solchem mag einer allerley creatur vndereinander mischen'.—'Yet everyone should be cautious not to make something impossible that nature would not allow, unless it would be that one wanted to make a dream work, in which case one may mix together every kind of creature'. See Albrecht Dürer, *Hierinn sind begriffen vier bücher von menschlicher Proportion* (Nuremberg, Hieronymus Andreae: 1528) fol. Tiv.



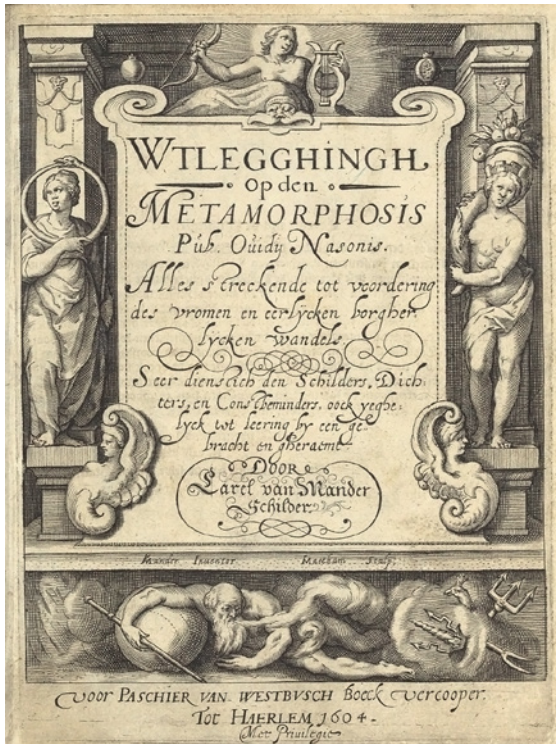


FIGURE 6.11  
Jacob Matham after Karel van Mander, Title-plate to Karel van Mander, *Wtlegghingh op den Metamorphosis Pub. Ovidii Nasonis* (Haarlem, Paschier van Westbusch: 1604). Engraving, 17.5 × 12.6 cm. The Hague, National Library of the Netherlands.

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a separate title page for it which, like the main title page of the *Schilder-Boeck*, was engraved by Jacob Matham, who also executed the series of the *Four Times of Day* [Fig. 6.11].<sup>63</sup> Jochen Becker has shown that the title page of the *Wtlegghingh* refers—by way of a riddle to be solved by the attentive reader—to Van Mander's commentary on the first book of Ovid's poem and, in particular, to the first chapter of his own *Wtbeeldinge der Figueren* (*Depiction of Figures*), the last book of the *Schilder-Boeck*, which is often paired with the *Wtlegghingh*.<sup>64</sup> Entitled *Hoe sy de eerste Godtheden / oft beginselen der dinghen / hebben uytghebeeldt* (How [the Pagans] Depicted the First Deities, or Beginnings of Things), the chapter opens with a reference to Boccaccio and other poets who 'call Demogorgon the first father of all'. He was, Van Mander states, 'painted as a pale, wrinkled, grey-haired, and bearded old man, covered

63 Widerkehr, *Jacob Matham* vol. 2, 268–269, cat. 271.

64 Becker J., "From Mythology to Merchandise: An Interpretation of the Engraved Title of Van Mander's *Wtlegghingh*", *Quaerendo* 14 (1984) 18–42.

with green moss, and overshadowed by moist mist clouds, lying lazily in the front part of a double cave or pit'.<sup>65</sup>

The lower register of the title page of the *Wtleghghingh* shows Demogorgon as a bearded old man holding a sceptre in his right hand and embracing the earth in the form of large ball. The smoke emanating from his mouth is gathered into Ovid's 'rough, unordered mass' or 'blind heap of things' from which the elements emerge, here represented by attributes of the gods (Jupiter's thunderbolts signify fire, Juno's peacock air, Neptune's trident water, and Pluto's two-pronged sceptre earth).<sup>66</sup> The opening passages of the text of the *Wtleghghingh* also describe the personifications of Eternity with the snake biting its own tail (the *ouroboros*) and the 'many-breasted Mother of the Earth adorned with flowers and fruit', or self-creating Nature (*natura naturans*), who stand before two pilasters that frame the text of the title page.<sup>67</sup> Van Mander explicitly states that his aim is to bring the 'hidden teachings' from the dark realm of Chaos to the bright domain of Phoebus Apollo—shown as a radiant figure crowning the title cartouche.<sup>68</sup>

In the opening chapter of the *Wtbeeldinge* on the 'first deities, or beginnings of things' Van Mander discusses the figures in the depths of the double cave; while this passage is not illustrated in Matham's title page, it is essential for understanding this essay's main character, Morpheus, the son of Somnus.<sup>69</sup> Behind Demogorgon, in the deepest, darkest cavern, lie, the text states, 'black Erebus' (Hell) and Night, respectively the son and daughter of Earth (herself an offspring of Demogorgon and Chaos). Night holds in her arms two of her children, Sleep and Death, one white, the other black. Van Mander concludes this section with a description of Somnus (one of the siblings in Night's arms) as a winged youth, and the god most agreeable to men. As in Cartari, here too

65 Van Mander, *Schilder-Boeck (Wtbeeldinge der Figueren)* fol. 124v: 'Den eersten Vader van allen / noemt den Hetrusschen Poeet Boccatius, en ander / Demogorgon. Desen was gheschildert als een bleeck / berimpelt / graeuw-hayrigh / en baerdigh oudt Man / met groen mosch becleedt / en beschaduwt met vochtighe mist-wolcken / liggheende luylijck in't voorste deel van een dobbel Spelonc oft kuyt'.

66 Ibid.: 'ghelijck eenen onbesuysden hoop'. See the description of chaos in Ovid, *Metamorphoses* vol. 1, 2–3: 'rudis indigestaque moles | nec quicquam nisi pondus iners congestaque eodem | non bene iunctarum discordia semina rerum'. 'a rough, unordered mass of things, nothing at all save lifeless bulk and warring seeds of ill-matched elements heaped in one' (Met. 1. 5–9); 'caecoque acervo' (Met. 1. 24).

67 Ibid.: 'met bloemkens en vruchten gheciert / de veel-borstighe Moeder d'Aerde'.

68 Mander, *Schilder-Boeck (Wtleghghingh)* fol. \*4v: 'oft dat die verborghen schoon leeringhen uyt den donckeren Chaos tot den lichten Phoebum opgehevoert hadden moghen worden'.

69 Mander, *Schilder-Boeck (Wtbeeldinge der Figueren)* fol. 124v.

Somnus is described as holding a horn in one hand and an elephant tusk in the other: from the former emanate true dreams, from the latter false ones. Van Mander also mentions the House of Somnus and Somnus's most important sons (Morpheus, Phobetor, Phantasus), also described in Book Eleven of Ovid's *Metamorphoses*.<sup>70</sup>

Van Mander's preoccupation with the realms of Demogorgon, Chaos, Somnus, and related gods must be seen in the context of a wider interest in theories of creation and fabrication, both cosmological and artistic.<sup>71</sup> Boccaccio's highly influential *Genealogia deorum* was undoubtedly an important source for Van Mander's account of the beginning of all things. It was Boccaccio who established Demogorgon—a figure unknown to antiquity—as the 'languid forefather of all the pagan gods', 'surrounded everywhere by clouds and gloom' and 'enveloped in a certain slimy pallor and relentless humidity, exhaling an earthy, foul, and fetid odour'. Boccaccio's description was taken up almost verbatim by Vincenzo Cartari and, later, by Van Mander.<sup>72</sup> Whereas the title page of Van Mander's *Wtlegghingh* presents Demogorgon as the maker and creator of the material world, contrasting his dark cave with the bright terrain in which Apollo resides, Van Mander's drawing for the print of *Night* features Morpheus as the creator of fleeting imaginations and dreams. As the residence of 'dreams' (Somnus's one thousand sons) or literary and visual fictions, the House of Sleep gained prominence in intellectual circles that emphasized the role of the interior senses of the imagination in the creation of works of art. In early modern visual and performative culture, Demogorgon's dark dwellings in the bowels of the earth and Ovid's House of Sleep functioned as complementary spaces of creation dedicated to the creation of the natural world and the visualization and materialization of immaterial dreams.

It has hitherto gone unnoticed that Van Mander also refers to the cave of the god of sleep in another decisive passage of *Den Grondt*, in the sixth chapter, on the 'figuring of human affects, passions, desires, and sorrows'. Towards the end of this chapter, Van Mander offers the following advice to young painters:

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70 Ibid.

71 Thimann M., "Weltschöpfung – Werkschöpfung: Zur Metaphorik von Chaos und Kosmos im 16. Jahrhundert am Beispiel des Archäologen Jean Jacques Boissard", in Guthmüller B. – Hamm B. – Tönnemann A. (eds.), *Künstler und Literat: Schrift- und Buchkultur in der europäischen Renaissance* (Wiesbaden: 2006) 253–295.

72 Boccaccio, *Genealogy of the Pagan Gods* 32–33 ('Preface 3'). Cf. Cartari, *Le imagini* fols. 8r–10r.



In order to do even more for the sake of this matter [the representation of passions], one should climb down into the deep cave, very far from here, somewhere near the land of the Cimmerians, where Morpheus's father [Somnus] has his kingdom, and is wont to snore together with his dreams. For it is my hope that this will kindle many more spirits, and the desire to pay yet more attention to the emotions in future will increase.<sup>73</sup>

On this account, it is during sleeping and dreaming that the (Netherlandish) painter receives ideas about how to depict human passions and desires. In a similar vein, Ugoni da Brescia, in his *Dialogo della vigilia e del sonno* (*Dialogue on Wakefulness and Sleep*) published in Venice in 1562, had asked the rhetorical question of whether many men had made the most beautiful inventions in the world when they were asleep. And contrariwise, were there not many who could not understand a difficult passage when they were awake, but discovered its true meaning while they slept.<sup>74</sup>

Van Mander's mention of Somnus and Morpheus in *Den Grondt* follows on his discussion of the most famous picture by the Greek painter Aristides of Thebes, a work mentioned by Pliny the Elder in his *Natural History*, which Van Mander describes in considerably more extensive detail. Acquired by Alexander the Great, the lost composition depicted the conquest of a city, but included, notes Van Mander, 'a small child innocently clutching at the wound its mother has received in the breast at which it is suckling'.<sup>75</sup> Van Mander wonders how the mother's face, expressing in equal measure two conflicting feelings, her fear of death and her concern for her child, was depicted by Aristides. According to Pliny, Aristides was the first 'to paint the soul and to give expression to the affections of man—I mean to what the Greeks call *ψυχή*—and also the emotions'.<sup>76</sup> In *Den Grondt*, Van Mander defines affects as the 'the soul,

73 Mander, *Schilder-Boeck* fol. 28v (stanza 70): 'Om veel meer te doen / tot deser matery // Mochtmen wel dalen ter dieper speloncken // Seer wijdt van hier / ergens by den Cymery,| Daer Morphei Vader heeft zijn impery // En met zijn droomen pleeght te ligghen roncken:| Dan mijn hop' is wel / dat dit noch ontvoncken |Sal menighen gheest / en den lust doen wassen // Voortaen beter op d'Affecten te passen'.

74 Ruvoldt, *The Italian Renaissance Imagery of Inspiration* 136. For the long tradition of the epistemological significance of dreams, see Clark S., *Vanities of the Eye: Vision in Early Modern European Culture* (Oxford: 2007) 300–328.

75 Mander, *Schilder-Boeck* fol. 28r–v (stanza 67).

76 Plinius Secundus C., *Naturalis Historia*, xxxv.98. I cite from *The Elder Pliny's Chapters on the History of Art*, trans. K. Jex-Blake (London: 1896) 132–33: 'is omnium primus animum pinxit et sensus hominis expressit, quae vocant Graeci ethe, item perturbationes'. The

which art contains within itself'.<sup>77</sup> Immediately after he advises painters to descend into the cave of Morpheus's father (in other words, to lie down and sleep) Van Mander describes affects and emotions as 'very pretty secrets, enough of which come art's way of their own accord'. Good masters use them more often 'than they themselves realise'.<sup>78</sup> Vasari is wrong when he claims, on the basis of Michelangelo's *Last Judgement*, that no painter before Michelangelo had concerned himself with the emotions, Van Mander goes on, for this 'does not sufficiently agree with Pliny'.<sup>79</sup> Van Mander concludes the chapter by advising painters to follow Lysippos' recommendation to Eupompus.<sup>80</sup> For when Eupompus asked Lysippos for advice as to which of the ancients he should take as his example, Lysippos led him to the market place crowded with men, women, and children.<sup>81</sup> In Van Mander's *Schilder-Boeck*, the market place and the cave of Morpheus's father Somnus are presented as complementary sites of inspiration for the depiction of affects and passions. While the market place offered multiple opportunities to observe nature, the cave of Somnus provided access to the treasure of images stored in the imagination, the location of which was originally revealed in dreams.

This essay has explored the intersections between the imagination, dreams, and emotions, as well as between the image-making powers of the mind and of the Netherlandish artist, using the example of a hitherto largely ignored 1601 drawing by the most important theoretician of Netherlandish painting. Van Mander's drawing presents the combinatory work of the imagination during dreaming, when it is most active and vivid and least controlled, as an

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passage is followed by Pliny's description of the painting of the wounded mother with her child.

77 Mander, *Schilder-Boeck* fol. 27r (stanza 55).

78 Mander, *Schilder-Boeck* fol. 28v (stanza 71): 'Want t'zijn [d'Affecten] seer bequame secreten /| Die ghenoech van zelfs de Conste toevallen / Soo dat goede Meesters (nae mijn vermeten) | Dese meer ghebruycken dan sy selfs weten'.

79 Ibid. (stanza 72).

80 Mander, *Schilder-Boeck* fols. 28v–29r (stanza 73).

81 Cf. Van Mander's life of Eupompus: Mander, *Schilder-Boeck* fol. 70v: 'Waer op Eupompus hem heeft ghebracht / daer hy hem dat soude laten sien / t'welck was op de Marckt / die vol was van alderley volck / Mannen / Vrouwen /en kinderen'. Cf. Plinius, *Naturalis Historia*, xxxiv.61. I cite from *The Elder Pliny's Chapters on the History of Art* 48–49: 'eum enim interrogatum, quem sequeretur antecedentium, dixisse monstrata hominum multitudine naturam ipsam imitandam esse, non artificem'—'That painter when asked which of the earlier artists he followed, pointed to a crowd of people, and replied that nature should be imitated and not any artist'.

analogue to the work of the painter; and, interestingly, he chose the medium of pen-and-ink, evoking rather than showing colour. The fashioning and self-fashioning of Netherlandish painters as Ovidian masters of transformation reveal, I think, both a concern with the epistemic status of mental and material images in an age of religious and cultural reform, and an increased interest in Netherlandish traditions of image-making. Van Mander's dreamscape presents the interior world of a Netherlandish painter fashioning his artistic persona both according to northern traditions and in response to Italian views of Netherlandish art.

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- Constbemers en dichters, oock allen staten van menschen* (Haarlem, Paschier van Westbusch: 1604).
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## *Agere Corporaliter*: Otto Vaenius's Theory of the Imagination

*Ralph Dekoninck, Agnès Guiderdoni, Aline Smeesters*

The Dutch artist and humanist Otto Vaenius (Otto van Veen, 1556–1629), best known as an early master of Peter Paul Rubens (1577–1640), has recently been rediscovered as a talented emblemist and author of several popular emblem books published in the beginning of the seventeenth century, including *Horatiana emblemata* (1607), *Amorum emblemata* (1608), and *Amoris divini emblemata* (1615). Born in Leiden in 1556 into a Catholic family, Vaenius remained faithful to catholicism and to the Habsburg dynasty. In his youth, he entered the service of the Prince-Bishop of Liège as a page; after traveling to Rome and perhaps to Munich and Prague, where he may have visited the court of Holy Roman Emperor Rudolph II (1552–1612), he settled in the southern Netherlands in the service of Alexander Farnese (1545–1592), Duke of Parma and Governor of the Spanish Netherlands. In 1593, Vaenius became a master in the Antwerp painters' guild, and later, engineer at the Antwerp Citadel (in the service of the Archdukes Albert and Isabella, sovereigns of the Spanish Netherlands). He was appointed as a surveyor of the Mint (muntwaerdein) in Brussels, a city where he settled in 1615 and died in 1629. Traditionally regarded as a Catholic artist active in the Spanish Netherlands, Vaenius was also a Dutch exile with strong attachments to his homeland, and an open mind whose sympathies extended to men of various religious and philosophical persuasions.<sup>1</sup>

In a request submitted in 1619 to the Archdukes Albert and Isabella, Vaenius declared that he would devote his remaining years to the creation of engravings 'and other speculative works, among which the True Precepts of the Art of Painting and Sculpture with notes and images'.<sup>2</sup> Unfortunately, the whereabouts of this treatise are unknown—and indeed, it may never have been written.

1 The most complete recent biography is that of Porteman K., "Veen, Otto (Octavio) van", in *Nationaal Biografisch Woordenboek*, vol. 20 (2011) 1060–1087.

2 '[...] desearia emplear el resto de sus años en sacar a luz estampas y algunas obras speculativas, como entre otras los Verdaderos Preceptos del Arte de Pintura y Esculptura con notas e ymagines [...]'. Quoted by de Maeyer M., *Albrecht en Isabella en de schilderkunst* (Brussels: 1955), 347–348.

Nevertheless, it is tempting to identify as one of the ‘obras speculativas’ by the *pictor doctus* his *Physicae et theologiae conclusiones* of 1621. This slim and visually intriguing treatise on predestination and free will, rarely studied until now, may offer a major key to understanding Vaenius’s rich and multifaceted visual production, as it is underpinned by an original conception of human imagination. The present study offers a general description of the treatise, followed by a detailed explication of the chapter devoted to the imagination (with reference to other relevant chapters as well) and an attempt to illuminate the original and, in some respects, unorthodox aspects of Vaenius’s theory, by contrasting it with the writings of three contemporaries whom Vaenius may have known, Jan Baptist Van Helmont (1580–1644), Thomas Fienus (1567–1631), and Federico Zuccari (1542–1609). We will attempt to reconstruct Vaenius’s conception of the artist by comparing it to his well-known representation of the *pictor* in the *Horatiana Emblemata*, and conclude by situating Vaenius’s theory of the imagination more broadly in the intellectual landscape of his time.

### The *Conclusiones*

The *Physicae et theologiae conclusiones* (1621), an emblematic booklet comprising forty-three pages, is probably the least famous and most enigmatic of Vaenius’s works.<sup>3</sup> The title, *Conclusiones*, refers to the tradition of university

3 Vaenius O., *Physicae et theologiae conclusiones, notis et figuris dispositae ac demonstratae, de primariis fidei capitibus, atque inprimis de praedestinatione, quomodo effectus illius superetur a libero arbitrio* (Orsellis [sic]: 1621). Geissmar C., “The Geometrical Order of the World: Otto Van Veen’s *Physicae et theologiae conclusiones*”, *Journal of the Warburg and Courtauld Institutes* 56 (1993) 168–182; Melion W.S., *The Meditative Art. Studies in the Northern Devotional Print, 1550–1625* (Philadelphia: 2009) 340–341; Dekoninck R. – Guiderdoni A., “Reasoning Pictures: Vaenius’s *Physicae et Theologiae Conclusiones* (1621)”, in McKeown S. (ed), *Otto Vaenius and his Emblem Books* (Glasgow: 2012) 175–196; Catellani A., “Emblematic and Graphic Processes in Vaenius’s *Physicae et Theologiae Conclusiones* (1621): Semiotic Observations”, in McKeown, *Otto Vaenius and his Emblem Books*, 197–210; Van Veen O., *Physicae et theologiae Conclusiones*, 1621, trans. Smeesters A., introduction by Catellani A. – Dekoninck R. – Granjon E. – Guiderdoni A. – Smeesters A. (Turnhout: 2017); Dekoninck R. – Guiderdoni A., “La théologie par figures géométriques dans les *Conclusiones Theologiae et Physicae* d’Otto Van Veen (1621)”, in Gay J.-P. – Stiker-Métral Ch.-O. (eds.), *Les Métamorphoses de la théologie. Théologie, littérature et discours religieux au XVII<sup>e</sup> siècle* (Paris: 2012) 262–274; Dekoninck R., “Peace through the Image from Van Barrefelt to Van Veen”, in Leuschner E. (ed.), *Die Rekonstruktion der Gesellschaft aus der Kunst: Antwerper Malerei und Graphik in und nach den Katastrophen des späten 16. Jahrhunderts* (Petersberg: 2016) 37–42; Dekoninck R., “Visual Representation as Real Presence. Otto van Veen’s *Naples Vision of Saint Thomas Aquinas*”, in

theses, involving in this case two different disciplines: theology and physics. The main topic of the book pertains to theology: it is a defence of free will against predestination. As for physics, the prefatory letter to the reader claims adherence to the theories of the 'modern physicists and chemists' (*neoterici physici et chymici*), namely Isaac Hollandus (unknown) and Paracelsus (Philip von Hohenheim, 1493–1541). Vaenius's stated ambition was to combine their mutual vision of man and the universe (principally the idea that everything in the world is composed of three principles corresponding to salt, sulphur, and mercury) with the theological teachings of the Catholic Church.

Vaenius chose a wholly innovative method, using 'mathematical figures' to accomplish his goals. The booklet is divided into twenty chapters, each consisting of two facing pages: on the right-hand page of each pair, an engraving represents a geometrical and diagrammatic figure with letters, while the left-hand page contains the 'caption' for the image, a description and explanation of the letters and figures, and a few authoritative quotations. While Vaenius's project consists in giving geometrical formulation to theological truths, it is far from a rigorous mathematical demonstration: from one chapter to the next, the progressively more complex diagrams develop in an unpredictable and seemingly fanciful way.

The first five chapters of the *Conclusiones* are devoted to the creation, from the eternal existence of 'the Being and the One' to the creation of the universe and the creation of man, who is composed of three parts—body, spirit, and soul. At the intersection of these three components stands the divine nature of man. In the engravings, a Trinitarian triangle designates this deity in man (*deitas hominis*), which makes him a free agent in his dealings with God and with other men. The subsequent four chapters demonstrate the power of evil in creation. This portion of the book is framed by the fall of Lucifer and the fall of Adam. Vaenius expounds on the agency of the deity in man, which tends either towards God or towards terrestrial things; and the omnipresence of God in his creation, who does not affect the essentially free divine nature of man. The tenth chapter, on 'the coming of Christ through the Virgin Mary', introduces the redemption that God has granted to mankind through the incarnation.

Following these first ten chapters, which range over the history of the world from creation to redemption and provide a general cosmological and anthropological framework, Vaenius devotes six chapters to individual human life, from conception (which raises the question of predestination) to death and resurrection on Judgment Day. The agency of man in the world and during

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Van Eck C. – Van Gastel J. – Van Kessel E. (eds.), *The Secret Lives of Art Works. Exploring the Boundaries between Art and Life* (Leiden: 2014) 179–199.

this life is addressed by way of two topics: 'good works' (articulated with divine grace and human merit) and, quite surprisingly, the power of the imagination (Chapter 14: 'Man's Imagination is a Real Being', to which we will return). The final four chapters are devoted to the Church and to cult matters: the Eucharist; the role of sacraments in salvation (Vaenius considers them not absolutely necessary); the defining characteristics of Catholic Church; and the efficient and necessary visibility of Christianity.

The twenty chapters are clearly structured to examine the reciprocal agency of free will and divine predestination. This was a highly controversial and vexed topic in the early seventeenth century, dividing not only Catholics and Protestants, but also Catholics among themselves (especially Dominicans and Jesuits). The burning issue which lies at the core of the book probably explains why a veil of mystery shrouds its publication. The volume bears no publisher's name, nor any approbation, and its alleged locus of publication, *Orsellis*, defies identification.<sup>4</sup> While the name Otto Vaenius appears on the title page, a 'note by the typesetter' suggests that the publication happened without his knowledge. A letter from Rubens (Otto's former pupil) to Otto's brother Pieter van Veen (1563–1629) dated 19 June 1622 mentions a 'little anonymous book about the universal theory or something like that' that Otto had, it is implied, published shortly before: the book to which Rubens refers may be the *Conclusiones*. Once again, mystery envelops the book: Rubens asks for a copy, with the solemn promise 'to keep this favour entirely confidential, without talking about it to anybody, if it were necessary to behave like this'.<sup>5</sup> His caution was not excessive: the *Conclusiones* was indeed deemed sufficiently problematic by the theological authorities to elicit an inquisitorial inquiry in the years 1627–1630, as we will show below. A condemnation written in 1630

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4 Some scholars have suggested it refers to Ursel (near Ghent) or Oberursel (near Frankfurt) (W. Stirling Maxwell quoted by Ruelens, C.L. (ed.), *Pierre-Paul Rubens: documents et lettres* (Brussels, 1877), 118–119), and, more recently, Brussels (Geissmar, "Geometrical Order of the World", 169). Franciscus Sweertius in his *Athenae Belgicae* (Antwerp: 1628) writes that the *Conclusiones* were published in Leiden.

5 'Intendo che signor Ottavio Veen suo fratello ha messo in stampa un'operetta anonima della teoria universale o simil cosa, il quale io desiderassi summamente di vedere, e si V.S. fosse servita di comunicarmela, dovendo la senza dubio haver un esemplare, l'havrei summamente caro e l'accettarei sotto parola di huomo di bene di tenere questo suo favore secretissimo senza parlarne con huomo vivente si cosi è necessario'. Italian text quoted by Geissmar, "Geometrical Order", 176 note 17.



(after the death of Vaenius) requires the book be burned.<sup>6</sup> We do not know if this sentence was executed; only fifteen or so copies are still extant.<sup>7</sup>

The most striking element of the *Conclusiones* is its strange diagrams. The decision to use geometrical diagrams probably stems from the fact that they permit in a fixed image the representation of movement—both movement within each individual engraving (suggested by dotted lines or rays) and movement inherent to the whole series of engravings.<sup>8</sup> This implied movement corresponds to the dynamic process of attraction and repulsion, which is at the core of Vaenius's treatise: the salvation of man depends on his free movement towards God, in a process of configuration to the image and likeness of God; conversely, damnation ensues from movement in the other direction. The interactions that are constantly in motion are indeed the main focus of Vaenius's treatise, as will be borne out in detail in our analysis of the chapter devoted to imagination.

## Vaenius's Theory of the Imagination

### Chapter 14: Man's Imagination Is a Real Being

Man's imagination, whether of his soul or spirit, is a real being, consisting (similarly to every created body) of a body, a spirit, and a soul, more subtle however than in the case of the other sensitive bodies; and just as God, through his imagination or word NNN (which is a real being of the

6 'Utroque libro exusto, videtur auctor e Belgio proscribendus [...]'. Mechelen, Aartsbisschoppelijk Archief, ms *Causa J.B. Helmontii*, 2<sup>d</sup> volume in-folio, piece 4, at the end (edition: C. Broeckx, "Notice sur le manuscrit *Causa J.B. Helmontii* déposé aux Archives Archiépiscolaires de Malines", *Annales de l'Académie d'Archéologie de Belgique* 9 (1852) 277–367: 307).

7 Geissmar mentions three copies respectively kept in the British Library (London), the Herzog-August Bibliothek (Wolfenbüttel) and the Bibliotheca Philosophica Hermetica (Amsterdam) (Geissmar, "Geometrical Order", 169 note 6). We have seen two further copies in Oxford University, Balliol College Library (540 C 11 (1) and 540 C 11 (2)). Online catalogues indicate that the book is also available in the following libraries: Oxford, University College Library; Oxford, Bodleian Library; Cambridge, University Library; Copenhagen, Royal Library; London, Middle Temple Library; Madrid, National Library; Göttingen, Universitätsbibliothek; Stockholm, National Library; Gotha, Forschungs- und Landesbibliothek; photocopies are also kept in the Hendrik Conscience Heritage Library of Antwerp and at the Warburg Institute.

8 The convention of using dotted lines or rays to represent the invisible was also adopted at the same time in Flemish engravings showing God as a sort of radiation, a visual trick to solve the problem of the unfigurability of the divine.

most high God) has created the universe B, so man, through his imagination O, creates real beings P, which act corporally on things and bodies, as it appears more forcefully, for a certain natural reason, in the pregnant woman than in other beings; indeed, the spirit or the soul alone does nothing without the body, nor the body without the spirit and the soul, as they cannot be separated one from another, and are bound together forever. Therefore, if the imagination or cogitation of the natural, rational spirit (which can be known by the devil and by man) is accompanied by faith or confidence, the magnitude of its extension, when it expresses itself in action, is incredible; but the feeling of man's Divine Nature, accompanied by faith or confidence, and expressing itself in a supernatural way through imagination, cannot be understood by any natural reason: this knowledge must be left to God alone.<sup>9</sup>

*He spoke, and things came to be (Psalms, 32).*<sup>10</sup>

*Nothing incorporeal acts on the corporeal (Aristotle).*<sup>11</sup>

Vaenius opens Chapter 14 by stating that the imagination is a *real being* and, as such, comprises a body, spirit, and soul—as does everything created in this world. Vaenius's view follows from his basic Paracelsian assumption (as he explains in his letter to the reader) that everything in the world is made of three parts: a body, a spirit, and a soul (corresponding to the three elements salt,

9 Vaenius, *Conclusiones*, 30: '*Caput XIV: Quod imaginatio hominis sit ens reale*. Imaginatio hominis, tum Animae, tum spiritus, ens est reale, constans (aeque ac omnia corpora creata) corpore, spiritu et anima, quamvis subtilioribus quam caetera sensitiva corpora; et sicut Deus sua imaginatione aut verbo NNN (quod ens reale summi Dei est) creavit universum B, sic homo imaginatione sua O creat entia realia P, quae corporaliter agunt in rebus et corporibus, sicut in muliere praegnante certa ratione naturali fortius apparet quam in aliis; nam spiritus aut anima sola nihil agit sine corpore, nec corpus sine spiritu ac anima, cum ab invicem separari nequeant et in aeternum cohaereant. Imaginatio enim aut cogitatio spiritus rationalis naturalis (quae daemone ac homini potest innotescere), si fide aut confidentia comitetur, incredibile est (quando in actum exsurgit) quam late se extendat: hominis vero Deitatis affectus, cum fide aut confidentia supernaturaliter per imaginationem exsurgens, nulla ratione naturali comprehendere potest, solique Deo illa cognitio relinquenda. *Ipse dixit, et facta sunt* (Psal. 32). *Nihil incorporeum agit in corporeum* (Arist.).' The translation is ours, with the support of Geissmar's summary ("The Geometrical Order of the World" 172–173).

10 Psalms 33, 9.

11 Reference not identified.

sulphur, and mercury).<sup>12</sup> Man is tripartite, and the imagination is conceived therefore as stemming from either his soul or his spirit.<sup>13</sup> The Imagination itself is tripartite, made of a (more subtle kind of) body, spirit, and soul. Last but not least, the products of the imagination are also *entia realia*, thus made of body, spirit, and soul.

The ability of human imagination to create real beings is explicitly compared to God's own power of creation: a parallel is drawn between the production of the universe (B) through God's word (N) and the production of real beings (P) through man's imagination (O) ( $O/P = N/B$ ). According to this audacious comparison, visually translated on the opposite page [Fig. 7.1], human imagination achieves the status of *Verbum Dei*, identified with a kind of divine imagination (*sicut Deus sua imaginatione aut verbo [...]*). The imagination, both human and divine, has the power to incarnate ideas, to give them a corporeal existence, which is confirmed by the quotation from *Psalms* ('ipse dixit et facta sunt'). The relevance of this quotation depends on the equivalence posited between God's word and God's imagination.

The text further states that the products of the imagination have the power to act corporally (*agere corporaliter*) on other bodies. The only concrete example Vaenius gives (and which he presents as the most evident case) is that of pregnant women. Vaenius here refers to the concept of maternal imagination, according to which a mother's imagination may have a corporeal effect on her foetus—a belief already expressed by classical authors.<sup>14</sup> As we will see below,

12 Vaenius, *Conclusiones*, 3: 'Deinde e Physicis et Chemicis ostendo (sicut primum ab Isaco Hollando excellenti medico olim declaratum est, et postea Paracelso adscriptum) universum hoc omniaque entia particularia e sale, sulphure et mercurio constare, quae soluta, aut dispositione mutata, sunt oleum, sal, liquor, tum corpus, spiritus et anima, deinde (cum supra captum nostrum exaltata aut sublimata sint) substantia, vita et intelligentia; itaque omnia e trino et uno naturali demonstratione constare affirmant'. (Translation: 'Next, I show by physics and chemistry that (as has been first declared by the excellent physician Isaac Hollandus, and then ascribed to Paracelsus) this universe and every particular being are made of salt, sulphur and mercury, which elements, once dissolved or differently disposed, are oil, salt and water, then body, spirit and soul, next (when they have been exalted and sublimated beyond our reach) substance, life and intelligence; and so they proclaim, by a natural demonstration, that everything consists of three and one').

13 This may be compared with the traditional scholastic view, which attributes two parts to animated beings (body and soul) and considers imagination an internal sense of the sensitive level of the soul.

14 Battisti D., "Imitazione e gestazione umana (A proposito di Dion. Hal. De imit. VI p. 203, 1–6 Us. Rad.)", *Quaderni Urbinati di Cultura Classica* N.S. 35,2 (1990) 65–68. See for instance Aetius, 5, 12, 2; Dionysius of Halicarnassus, *De imitatione*, 6; Heliodorus, *Aethiopica*, 4, 8 and 10, 13–14; Galen, *Ad Pisonem de Theriaca*, 11; Soranus, *Gyn.*, 1, 12; Pliny, *Natural History*,

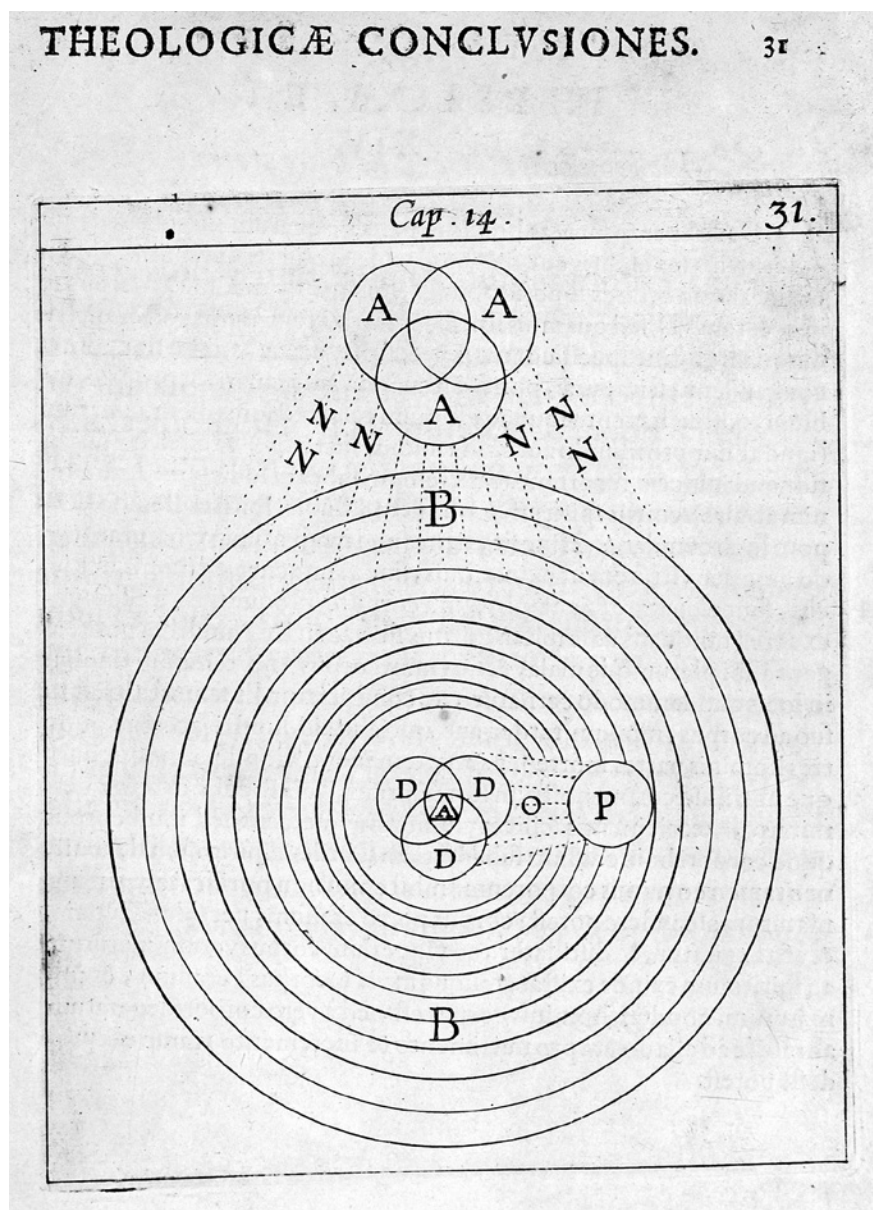


FIGURE 7.1 *Otto van Veen, Quod imaginatio hominis sit ens reale, engraving in Otto van Veen, Physicae et theologiae conclusiones (Orsellis: 1621) 31, London, British Library.*

this theory was still widely accepted in the early modern era and the explicative model implied not only the agency of the imagination as a faculty, but also the efficacious presence of an *image* produced by this faculty (a product of the imagination). The corporeal agency of the products of the imagination is taken by Vaenius as evidence for their corporeal nature, as suggested by his recourse to a quotation attributed to Aristotle: 'nothing incorporeal acts on the corporeal'. The origin of this quotation has not yet been identified; it may derive from a manual or a summary of Aristotelian principles. Brisk and clear-cut, the passage was probably further qualified by its original context and may have been used to signify that spiritual entities do not compromise themselves with matter and only act *indirectly* on it.<sup>15</sup> The passage functions here as the major premise of an implied syllogism: 'nothing incorporeal acts on the corporeal; yet we know by experience (in the case of pregnant women) that the products of the imagination may act on corporeal beings (such as a foetus); so the products of the imagination are not incorporeal'. In this way, Vaenius confirms his basic Paracelsian postulate (everything is tripartite) and likewise corroborates the resemblance of man to God (since both create real beings by their imagination alone), hence emphasizing man's fundamental dignity and freedom.

The final section of the chapter seems to distinguish between two modalities of the imagination, one natural and the other supernatural. The first stems from the rational spirit, and may be known (and even perhaps used) by the devil; although natural, its effectiveness is bolstered by faith and confidence. Vaenius does not clarify what kind of potency or effectiveness he has in mind, but a connection could be made with Chapter 15, where he mentions the ability of magicians to separate their minds from their bodies and to duplicate the latter, indicating that they do so 'in a natural way, either by virtue of the imagination, or with the help of the devil, or otherwise' (*'naturali modo, sive per virtutem imaginationis, sive adjumento daemonis, aut secus'*).<sup>16</sup> The second, supernatural modality of the imagination corresponds with the expression of man's divine nature; this modality too requires faith or confidence in order to be efficient, but its extension is knowable by God alone. As man, according to Vaenius, is the only creature with free disposition of his divine Nature (cf. also Chapter 5), he is also the only creature with access to this modality of the imagination. We must bear in mind that, as one of the faculties of the sensitive

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7, 52. The idea is still present in Ambroise Paré (*Œuvres complètes*, ed. J.-P. Malgaigne, II (Paris: 1841) 637–638).

15 We wish to thank our colleague Stéphane Mercier for his philosophical advice on this matter.

16 Vaenius, *Conclusiones*, 32.

soul, 'natural imagination' was traditionally supposed to be shared by animals as well.

In the diagram appended to Chapter 14, the position of the letter O, standing for the imagination, clearly indicates the relational status of this faculty, whose products are projected outside of man. If they emerge from their 'creator', the products of the imagination nevertheless remain bound to him forever. In Chapter 16, we read that on the day of the Last Judgment, when the bodies, souls, and spirits of men will be united again, every man will be accompanied by his 'actions, thoughts, and products of the imagination' as an army of little real beings attached to him, and whose weight, if they are impure, may pull him down to the abyss.<sup>17</sup> These actions, thoughts, and products of the imagination are represented in the corresponding diagram [Fig. 7.2] by small sets of three circles, *entia realia* composed of a body, spirit, and soul. Man is therefore responsible, in Vaenius's view, not only for what he does, but also for what he thinks and for what he imagines. All in all, human imagination is characterized in the *Conclusiones* as a noble faculty, through which man (as the true image of God) acts with dignity, liberty, and responsibility; and the products of the imagination are characterized by a certain density and a remarkable agency.

### Similiarities with Van Helmont

The chemist Jan Baptist Van Helmont, whom Vaenius probably encountered in Brussels at the court of Archdukes Albert and Isabella, developed similar views about the imagination.<sup>18</sup> The convergence between his and Vaenius's conceptions of the imagination is particularly striking in the following extract from Van Helmont's *Ortus medicinae*, from Chapter 16 of the treatise *De injectis materialibus* (a chapter entitled: 'Man, as an image of God, creates some beings which are something more than non-beings'):

Only God, indeed, is the supremely glorious creator, worthy of infinite praise, he who created the universe *ex nihilo*. But man, inasmuch as he is

17 Vaenius, *Conclusiones*, 34: 'Hinc colligas fore ut homo in ultimo die, junctis suis tribus partibus [...] simul cum suis actionibus, cogitationibus et imaginationibus (quae entia sunt realia ipsique annexa, et quae palam eum comitantur) fulgeat [...]. E contra qui actionum et cogitationum suarum, entium realium, impuritate obruti sunt, istarum pondere onerati, ad inferos et abyssum descendent'.

18 Both men lived in Brussels (Vaenius as of 1615, Van Helmont as of 1616) and worked at the Archduke's court (Vaenius as 'garde de la monnaie', Van Helmont as a physician).

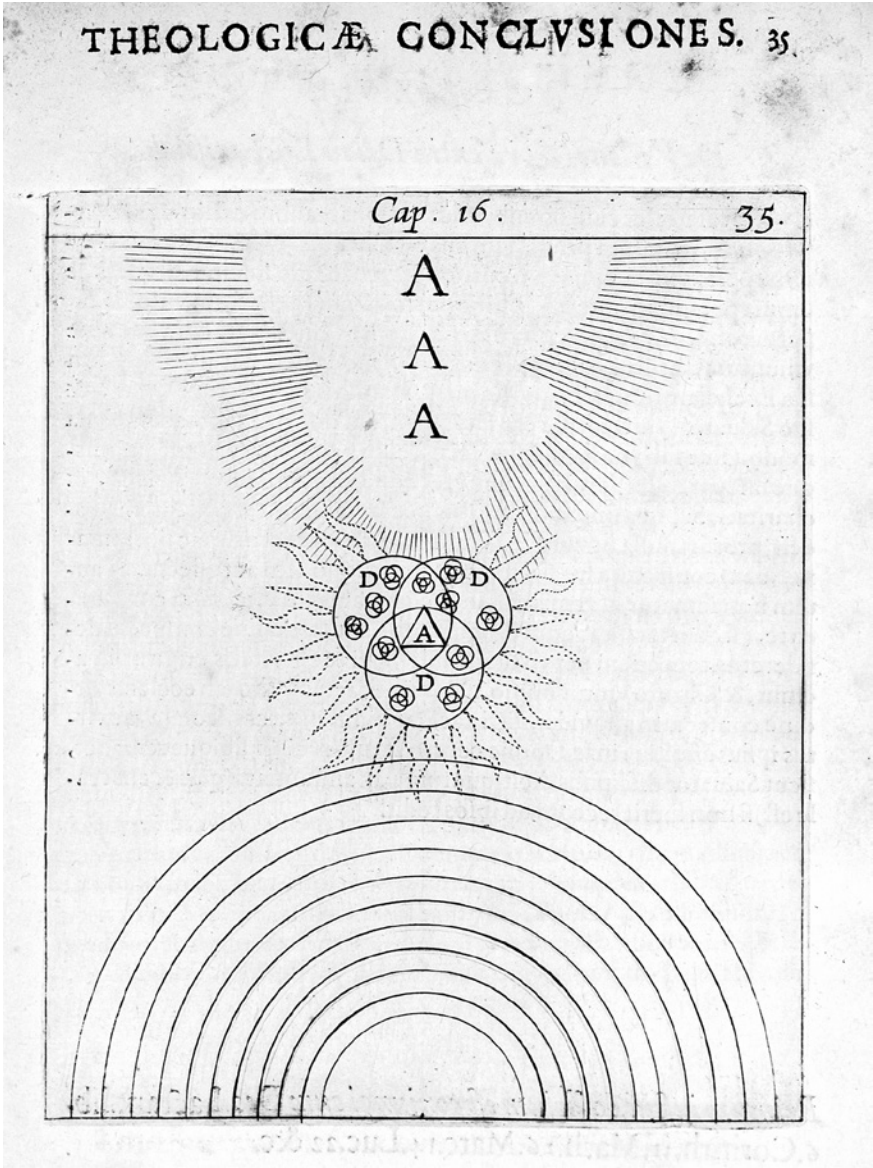


FIGURE 7.2 *Otto van Veen*, *Quod corporea et ceremoniae externae valeant ad movendum hominis Deitatem*, engraving in *Otto van Veen*, *Physicae et theologiae conclusiones* (Orsellis: 1621) 43, London, *British Library*.

the image of God, creates *ex nihilo* some beings of reason, or rather non-beings in their beginnings, and he does so by virtue of the proper ability of his imaginative power. [...] Indeed, when these kinds of conceived ideas finally dress themselves with a body, in the guise of an image built by the imagination, they already become substantial beings within this clothing, which they entirely and uniformly fill. And to that extent they become seminal and operative beings, that is, beings by which their very assumed subjects come to be totally directed. This power has been given to man alone.<sup>19</sup>

This same conception of the power of the imagination also underpins a treatise by Van Helmont on the magnetic healing of wounds (*De magnetica vulnerum curatione*) which was published the same year as Vaenius's *Conclusiones* (1621). The *De magnetica curatione* and the *Conclusiones* were examined and condemned together by professors of the Leuven Faculty of Theology around 1627–1630, as we know from a number of documents mentioning both books.<sup>20</sup> While Vaenius had already died (1629) by the time the condemnation was written (1630), the documents attest that the official of Mechelen had interrogated both men about the presumed heretical positions expressed in their

19 Van Helmont J.B., *Ortus medicinae, id est, initia physicae inaudita. Progressus medicinae novus, in morborum ultionem, ad vitam longam* (Amsterdam: L. Elzevier, 1648), treatise *De injectis materialibus*, chapter 16 (*Homo quatenus Imago Dei, creat quaedam entia, quae aliquid sunt amplius quam nonentia*), p. 601–602: 'Etenim solus Deus est creator summe gloriosus in infinitum laudabilis, qui universum creavit ex nihilo. Homo autem, quatenus est simulacrum Dei, creat ex nihilo quaedam entia rationis, sive nonentia in sui initio, idque in propria virtutis phantasticae dote. [...] Nam inprimis dum ejusmodi conceptae Ideae tandem se corpore vestiunt, specie Imaginis fabricatae per imaginationem, fiunt entia jam subsistentia in medio illius vestimenti, cui per totum aequabiliter insunt. Et hactenus fiunt entia seminalia atque operativa, a quibus videlicet ipsa suorum assumpta subjecta totaliter mox diriguntur. Haec autem potestas data est soli homini'.

20 The documents are: reports of the meetings of the Leuven faculty of theology, dated 12 and 19 September 1627 (Leuven, Rijksarchief, Inventaire n° 682, doc. 387, fol. 268); a censure written by seven professors of the faculty in 1630 (Mechelen, Aartsbisschoppelijk Archief, ms *Causa J.B. Helmontii*, 2<sup>d</sup> volume in-folio, piece 3, at the end; edition: Broeckx C., "Notice" 303); and an undated proposition of sanction by professor Joannes Schenckelius (Mechelen, Aartsbisschoppelijk Archief, ms *Causa J.B. Helmontii*, 2<sup>d</sup> volume in-folio, piece 4, at the end, edition: Broeckx, "Notice" 307). Actually the title of Vaenius' concerned book is not explicitly given, but its identification with the *Conclusiones* seems obvious. P. Nève de Mévergnies (*J.-B. Van Helmont, philosophe par le feu* (Paris: 1935) 134), who didn't know the *Conclusiones*, thought the condemnation concerned the *Théâtre moral de la Vie humaine*.



respective writings.<sup>21</sup> Apart from the documents mentioned, Vaenius's case file has unfortunately been lost and we cannot be certain of which heresies precisely he was accused. Van Helmont's case, however, is still available, and may offer insight into the problematic aspects of Vaenius's book as well.<sup>22</sup> The main elements of the Van Helmont case which we cite here are: a booklet with a list of twenty-four 'propositions' taken from Van Helmont's treatise, as well as three propositions summarizing the book and ascribed to Paracelsus, accompanied by commentaries by the Jesuit Jean Roberti and by censures from various European theologians (two editions, 1624 and 1634);<sup>23</sup> the reports of the questioning of Van Helmont by the official of Mechelen in 1627 on the 27 propositions;<sup>24</sup> and a censure written by the Leuven professors in 1630 on the same propositions.<sup>25</sup> Three of the propositions (6, 12, and 13) are of particular interest for our purpose.

In proposition 6, Van Helmont claims that, as an image of God, man too has the power to act by his will alone.<sup>26</sup> In proposition 12, Van Helmont speaks about a 'magical power' present in man, but which has been as it were asleep since the fall of man; it can be awakened by the Holy Spirit as well as by Satan.<sup>27</sup> Asked for more information during the trial, Van Helmont answered that this magical power consists of three elements: a burning will, a fervent imagination, and confidence. He added that he got this theory from Paracelsus, and that

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- 21 Cf. the report of 12 September 1627 which mention the 'responsionibus coram Reverendo domino Officiale factis per Ottoneum Vaenium et Joannem Baptistam Helmont'.
  - 22 The file is kept in Mechelen, Aartsbischoffelijk Archief, ms *Causa J.B. Helmontii*. Transcriptions are given by Broeckx, "Notice"; Broeckx C., "Interrogatoires du docteur J.B. Van Helmont sur le magnétisme animal", *Annales de l'Académie d'Archéologie de Belgique* 13 (1856) 306–350. A general report is given by Halleux R., "Le procès d'inquisition du chimiste Jean-Baptiste Van Helmont (1578–1644): les enjeux et les arguments", *Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 148,2 (2004) 1059–1086.
  - 23 *Joannis Baptistae Helmontii [...] propositiones notatu dignae* (Cologne: Birkmann, 1624 and Liège: J. Tournay, 1634). A transcription of both editions is given by Broeckx, "Notice" 313–327. See also the description by Halleux, "Le procès d'inquisition" 1065, note 35.
  - 24 Ms *Causa J.B. Helmontii*, 2<sup>d</sup> volume in-folio, piece 15. Edition Broeckx, "Interrogatoires" 313–321.
  - 25 Ms *Causa J.B. Helmontii*, 2<sup>d</sup> volume in-folio, piece 3. Edition Broeckx, "Notice" 295–303. It is the same censure at the end of which Vaenius is mentioned.
  - 26 Proposition 6: 'Si Deus agat per nutum, per verbum, sic oportuit hominem, si verum debeat dici eius simulacrum, agere nonnulla solo nutu. Neque enim id soli Deo vernaculum' (Broeckx, "Notice" 315).
  - 27 Proposition 12: 'Potestas magica in nobis a peccato velut dormit: ideoque excitatore opus habet, sive is sit Spiritus Sanctus per illuminationem [...], sive etiam Satanas' (Broeckx, "Notice" 316).

the power he was talking about was to be considered natural.<sup>28</sup> Proposition 13 runs as follows: 'The soul of every animal has the power to create a real being and, by its will, to send it quite far away'.<sup>29</sup> During the 1627 questioning, Van Helmont explained that 'by "the power of creating real beings", he referred to all the cases in which, by a powerful imagination and by the will, the ideas of the conceived image were expressed, as in the case of pregnant women who by their will conform their foetus to the image they have in mind'.<sup>30</sup> It is interesting to note that Van Helmont gives the same example as Vaenius; it was, evidently, a common one.

The theologians' censures point to at least two problematic points in the theory put forth by Van Helmont and Vaenius. The first is the assimilation of man to God: in traditional theology, only God is capable of creating *ex nihilo*, of incarnating his ideas by his will alone. The 1624 booklet adds to proposition 6: 'Doesn't this lead to the conclusion that man is able to create the sky and earth *ex nihilo*, to awaken the dead and to do the other things that Catholic faith ascribes to God alone?'<sup>31</sup> And in 1630, the Leuven censors made the following comment: 'this proposition is wrong and very close to heresy, as it denies that only God can act by his will alone, against this phrase of the Psalmist in Psalm 32: *He spoke, and things came to be*'.<sup>32</sup> The same biblical text was quoted, as we have noted, by Vaenius, who proclaimed on the contrary the similarity between God's and man's modes of creation.

The second point pertains to the confusion between the natural and the supernatural. The same 1630 censure on proposition 6 explicitly states that Van Helmont is trying to 'bring back into the breast of Nature' certain acts of

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28 1627 questioning on proposition 12: 'Interrogatus quid intelligat per potestatem magicam. Respondit se intellexisse voluntatem accensam, imaginationem ferventem, et confidentiam, et illa tria juncta efficiunt quidem potestatem et facultatem, quam respondens vocat magicam. [...] praedicta dicit se habere ex Paracelso. Potestatem vero illam magicam dicit esse naturalem' (Broeckx, "Interrogatoires" 318).

29 Proposition 13: 'Cujuscumque bruti anima vim habet creandi entitatem realem, et per voluntatem dimittendi eam longius [...]' (Broeckx, "Notice" 316).

30 'Dicit vero vim creandi entitatem realem se intelligere quoties forti imaginatione et voluntate fiunt ideae expressae istius imaginis conceptae, ut verbi gratia fit in praegnantibus, quae solo nutu traducant imaginem rei conceptae in foetum' (Broeckx, "Interrogatoires" 318).

31 'Hinc nonne aequè concludatur, hominem posse creare ex nihilo caelos et terras, excitare mortuos, et alia quae fides Catholica docet solius Dei esse?' (Broeckx, "Notice" 315).

32 '[Propositio] erronea est haeresisque proxima quatenus negat soli Deo vernaculum esse agere nonnulla solo nutu, contra illud Psalmistae Ps. 32: *Ipse dixit et facta sunt*, [...]' (Broeckx, "Notice" 297).

diabolic magic.<sup>33</sup> Debates flourished at the time between theologians, physicians, and philosophers regarding the interpretation of miracles (in particular, miraculous healings) and acts of witchcraft: could they be explained by the natural powers of the imagination alone (as had been argued by Pomponazzi) or did they require the intervention of God in the first case, the Devil or evil spirits in the second case? The theologians were of course eager to preserve both reverence for God's miracles and distrust of the Devil's manoeuvres.<sup>34</sup> In this perspective, Vaenius's theory must have appeared doubly problematic: first, because it makes it possible to explain acts of witchcraft as natural and, second, because he mixes the natural and supernatural levels, postulating the presence of a supernatural entity in the human heart (cf. Chapters 5 and 12).

The 1630 censure concludes by describing both Van Helmont and Vaenius as 'disciples of Paracelsus, that is, of the Devil'.<sup>35</sup> The influence of Paracelsus, acknowledged by the two men and identified by the theologians, is beyond any doubt, both concerning the theory of the three elementary principles, and concerning the conception of the imagination as the origin of a constant flow of images—in a double inner and outer movement—acting not only on the human mind but also on the world.<sup>36</sup>

### A Comparison with Fienus

In 1608, the Leuven professor of medicine Thomas Fienus (1567–1631) published a small treatise entirely devoted to the powers of the imagination (*De viribus imaginationis*, Louvain: 1608).<sup>37</sup> Fienus was particularly interested in the potential impact of the imagination on bodies, asking whether it can move a body (Chapter 5); whether it can cause diseases (Chapter 10) or heal them

33 'Testantur hoc exempla quae ex intimis diabolicae magiae adytis educta in naturae sinum conatur refundere [...]' (Broeckx, "Notice" 297).

34 See Halleux, "Le procès d'inquisition" 1067; Giglioni G., *Immaginazione e malattia. Saggio su Jan Baptiste Van Helmont* (Milan: 2000) 58–67.

35 '[...] duos hos in Paracelsi hoc est diaboli scola institutos discipulos, Venium et Helmontium [...]' (Broeckx, "Notice" 303).

36 On Paracelsus and imagination, see for instance Koyré A., *Paracelse (1493–1541)* (Paris: 2004) 42–43 and Schott H., "Invisible Diseases—Imagination and Magnetism: Paracelsus and the Consequences", in Grell O.P. (ed.), *Paracelsus. The Man and His Reputation, His Ideas and Their Transformation* (Leiden: 1998) 309–321.

37 On this book: Rather L.J., "Thomas Fienus (1567–1631). Dialectical Investigation of the Imagination as Cause and Cure of Bodily Disease", *Bulletin of the History of Medicine* 41,4 (1967) 349–367. We use the edition of London, 1657.

(Chapter 11); and, most pointedly, whether it can modify the body of a foetus (Chapters 13 to 24). The treatise seems to have enjoyed modest success in the first half of the seventeenth century.<sup>38</sup> It may be useful to note that Fienus had instructed Van Helmont at Leuven University—although Van Helmont did not hold him in great esteem.<sup>39</sup>

In general, Fienus remains faithful to traditional scholastic psychology. In keeping with the theories of Galen and Thomas Aquinas, he considers the imagination to be one of the ‘internal senses’ of the sensitive soul, whose productions are labelled *species*. He defends the position according to which those *species* are cognitive, immanent, and immaterial; as such, they cannot act directly on matter. They may however act indirectly, through the appetitive power, or through the emotions (which have an impact on the movement of the heart and on the movement of humours and spirits, possibly causing bodily alterations). Up to this point, Fienus remains faithful to Thomas Aquinas. But the problematic matter of foetuses marked by their mothers’ imagination leads Fienus to ascribe still another power to the imagination—the ability to regulate the conformative power:

*Question IX, conclusion XXXIII*: The imagination transforms the body not only by means of the appetite and movement of the heart, but by necessity also in another way. This conclusion is contrary to the divine Thomas, who in fact says everywhere that the soul does not alter the body except through the appetite and emotions, and the movement of the heart. It is nevertheless true. For many alterations that cannot be ascribed to the emotions alone, the reasons for which cannot be given unless some nearer cause is assigned, take place in the foetus through the power of the imagination. *Conclusion XXXIV*: the imagination alters bodies also by directing and modifying the conformative power.<sup>40</sup>

38 Giglioni, *Immaginazione* 62.

39 Giglioni, *Immaginazione* 62 and note 75.

40 ‘*Quaestio IX, conclusio XXXIII*: ‘Phantasia non solum mediante appetitu et motiva cordis, sed necessario enim etiam alio modo corpora immutat. Haec conclusio est contra D. Thomam; quippe qui ubique dicit animam non aliter corpora immutare, quam per appetitum et passiones et motum cordis. Est tamen vera. Etenim plurimae circa foetum virtute imaginationis eveniunt mutationes, quae non possunt solis animi passionibus adscribi, et quarum ratio dari non potest, nisi alia causa propinquior assignetur. *Conclusio XXXIV*: Phantasia etiam mutat corpora, dirigendo et modificando potentiam conformatricem’. Trans. Rather, “Thomas Fienus” 358.

Fienus returns to this point in Chapter 13, and it occupies the entirety of the second part of the treatise. Under conclusion 40, Fienus enumerates all the authorities and historical examples that affirm the power of the imagination on foetuses. At the end of this very lengthy list, he notes that, even if some of these cases are probably false, it would be audacious to deny all of them: the power of the imagination to change the foetus is thus patent.<sup>41</sup> Chapter 14 tackles the question, *how* does the imagination change the foetus?—a difficult question, which seems to lie outside the grasp of the human mind. Fienus first summarizes the opinions of prior scholars: Galen, Pliny, Avicenna, Isidorus, Augustine, Ficino, etc. He comes to the conclusion (*conclusio xli*) that the imagination is unable to change the foetus *per se et immediate*, in line with the earlier conclusions of the treatise; and that the *species phantastica* is neither efficacious nor productive *per se*. If some of the changes can be explained by the mediation of passions and the movements of humours and spirits, this does not however hold for the 'signatures' observed on some babies. With regard to those cases, Fienus repeats the hypothesis already given: the imagination can cause peculiar *notae* on the foetus by directing its conformative power. The mechanism is then further detailed. The *species* work as *exemplaria*; they are taken as models by the conformative power. This explanation allows Fienus to remain faithful to the cognitive nature of *species*, which do not act *per se* but are merely 'looked at' by a natural power. It further implies that the *species* should be brought down to the place where the conformative power acts—from the soul of the parents to the soul of the baby, located in the uterus. This can happen, writes Fienus, through the soul's passions, but only on very rare and specific occasions—notably, only when strong passions are aroused can the imagination mark the foetus. The theory is further elaborated in the subsequent questions.

Returning to our comparison with Vaenius's chapter, we note that Fienus starts from the same two premises as Vaenius: immaterial entities cannot act directly on material bodies;<sup>42</sup> and experience teaches that pregnant women's imaginations may have a physical impact on their foetuses. But from the same premises the two men draw different conclusions: whereas Fienus concludes that *species*, which are immaterial by definition, cannot be directly responsible

41 Page 207: 'His autoritatibus et exemplis, quae omnia negare nimis temerarium foret, videtur manifestum phantasiam foetum immutare. Non attuli equidem omnia haec exempla, quod credam omnia esse vera; puto enim aliqua esse falsa [...] Ad conclusionis autem probationem sufficit multa vera esse, non omnia'.

42 See for example question 9, conclusion xxix: 'etenim intellectus est immaterialis, et ideo non potest agere in materiam corporealem'.

for the observed changes, Vaenius concludes that the *species* must be corporeal after all.

### A Comparison with Zuccari

A final, illuminating comparison can be drawn with the famous art theoretical treatise by Federico Zuccari, *L'Idea de' Pittori, scultori et architetti* (Turin: 1607). The assumption that Vaenius might have met one of the Zuccari brothers (Taddeo or Federico) in Rome during his youth can be traced back to the *Academie der Bau-, Bild- und Mahlerey-Künste* (1675) by Joachim Sandrart; but this is probably based on a misreading of Van Mander's text, where such a meeting is mentioned with Vaenius's master Lampsonius. In any event, it remains possible that Vaenius also had personal contacts with Federico and/or was influenced by his style (as for Taddeo, he was already dead by the time of Vaenius's trip to Rome in the late 1570s).<sup>43</sup> Zuccari's artistic theories have long been associated with Neoplatonism, since the famous analysis of his treatise by Erwin Panofsky.<sup>44</sup> Further research suggests, however, that Zuccari was actually faithful to mainstream scholasticism.<sup>45</sup> Comparison of his theories with Vaenius's Chapter 14 reveals clear convergences, but also several shades of difference, with Zuccari remaining closer to orthodox theological views.

At the heart of Zuccari's thought lies the rich concept of *disegno*, or drawing, by which is meant not only external drawing, but also 'internal' and mental forms. *Disegno interno* is defined by Zuccari as 'a form or Idea in our spirit

43 Sandrart writes that Vaenius 'Rom und andere Städte des Kunst-trieffenden Italiens besucht, daselbst auch bey den Kunst-erfahrensten, sonderlich bey Taddeo und Friderico Zuccaro, sich [...] gebässert' (edition Peltzer A.R. (Munich: 1925) 152). Van Mander had written: '[...] soo dat Octavio goede onderrichtinghe gheschiede van Lampsonio, hoewel hy self de const niet en oeffende: dan hadse in zijn jeught niet alleen geoeffent maer oock zijnen omganch gehad met de vermaertste Meesters van Christenheyt als met Taddeus Zuccaro, en Federico te Room' (Van Mander K., edition Miedema, I, 463; English translation 439). On the possible stylistic influence of the Zuccari on Vaenius, see Van de Velde C., "Veen, Otto van", in Turner J. (ed.), *The Dictionary of Art*, vol. 32 (New York: 1996) 114–116.

44 Panofsky E., *Idea. A Concept in Art Theory* (1968) 85. Zuccari himself says in Chapter 5 that he follows Plato; but later in the same chapter he refers to Thomas Aquinas.

45 Kieft G., "Zuccari, Scaligero e Panofsky", *Mitteilungen des Kunsthistorischen Institutes in Florenz* 33 (1989) 355–368 (esp. 357–358). See also Smeesters A., "The *Simulacra avorum* in Jesuit Latin Poems by Wallius and Carrara: From Vergilian Imitation to Scholastic Philosophy and Art Theory", in Enenkel K. – Melion W. – De Boer W. (eds.), *Jesuit Image Theory, 1540–1740*, *Intersections* 45 (Leiden: 2016) 394–418.

which expressly and distinctly represents the things that our spirit intends'.<sup>46</sup> It may thus be considered more or less equivalent to Vaenius's 'products of the imagination' and Fienus's *species*. In keeping with scholastic theory, Zuccari maintains that God himself has ideas of this kind in His mind, ideas which are in fact inseparable from His divine nature, and through which He created the world and has full knowledge of it (Chapter 5).<sup>47</sup> It is precisely because he is an image of God that man has the capacity to produce internal drawing:

After God—in his goodness and to show a little portrait of the excellence of His divine art—created man in His own image and likeness, as for the soul, [...] he also wanted to give man the faculty to shape in himself an intellectual *disegno interno*, so that he could, in this way, know all creatures [...] and also in order that he could produce an infinity of artificial things similar to the natural ones [...].<sup>48</sup>

This divine filiation is symbolically encapsulated in the word *disegno* itself. At the end of his treatise, Zuccari proposes a fanciful etymology of the word, where *disegno* is a composite of *Dio* and *segno*, signifying 'sign of God', *segno di Dio*. Zuccari thus supports the complete freedom of human inventiveness by assimilating it to divine creation: for the artist, creation consists in imitating not nature, but the activity of God himself. Zuccari, however, takes care to underline the differences between divine and human *disegni interni*:

But man, in the shaping of this *disegno interno*, is very different from God; because where God has a single *disegno*, which includes everything and is not different from Him [...], man shapes in himself various *disegni* [...], and his *disegno* is an accident, besides the fact that it has a low origin, coming from the senses.<sup>49</sup>

46 Chapter 3: 'il Disegno interno in generale è un'idea e forma nell'intelletto rappresentante espressamente e distintamente la cosa intesa da quello'.

47 Cf. Thomas Aquinas, *Summa theologiae*, Ia, quaest. xv, ed. J.P. Migne (Paris: 1853).

48 Zuccari, *L'Idea* 14: '[Dio], havendo per sua bontà, & per mostrare in picciolo ritratto l'eccellenza dell'arte sua divina, creato l'huomo ad imagine & similitudine sua, quanto all'anima, [...] volle anco dargli facoltà di formare in se medesimo un Disegno interno intellettuale, accioche col mezzo di questo conoscesse tutte le creature [...] & in oltre accioche [...] potesse produrre infinite cose artificiali simili alle naturali [...]'].

49 Zuccari, *L'Idea* 14: 'Ma l'huomo nel formar questo Disegno interno è molto differente da Dio; perche ove Iddio ha un sol Disegno [...], comprensivo di tutte le cose, il quale non è differente da lui [...], l'huomo in se stesso forma varii Disegni [...], e però il suo Disegno è accidente, oltre il che hà l'origine sua bassa, cioè da i sensi'.

Zuccari is most interested in the fact that *disegno interno* can serve as a model for the artist when he realizes his artworks—in the same way as God created the universe. According to his theory, if every single man shares with God the ability to conceive a *disegno interno*, only the artists (or craftsmen) accomplish complete similitude with the divine act of creation, as they transform their conceptions into matter. For Vaenius, by contrast, the very act of imagining already constitutes a full act of creation, generating real beings. This divergence is rooted in the status given to internally produced images. Vaenius makes them corporeal, able as such to have a physical impact on the external world. Zuccari, on the contrary, says from the beginning that *disegno interno* ‘non è materia, non è corpo’ (Chapter 3); there is only one way it can lead to material instantiations, and that is if one takes it as a model and reproduces it in matter. Just such an *exemplar* appeared in Fienus’s theory of the *species*; he went a step beyond traditional scholasticism, averring that a *species* could be taken as a model by a natural conformative power independently of man’s will—but this he restricted to highly specific, rare occasions.

### Vaenius’s Conception of Artistic Creation

Zuccari’s text has enabled us to establish the link between the theory of the imagination and the matter of artistic production. This link, as we have seen, was not made explicitly in Chapter 14 of the *Conclusiones*. The final, twentieth chapter of the *Conclusiones* deals with works of art, but not with regard to their origin in human imagination. Rather, it dwells on the impact they may have on the spirit of the viewer [Fig. 7.3]. Chapter 20 is concerned with the utility of sacramental and devotional images as spurs to faith or, as the title specifies, ‘How Corporeal Things and External Ceremonies Are Efficacious at Moving the Deity in Man’. This chapter presents a theory of the efficaciousness of images or, more precisely, a theory of the reception of and interactions with images. Vaenius proclaims that the forms and the *species* can induce man to become more like God, and can call forth good and pious impulses. More precisely, images, ceremonies, and pious signs (established by God Himself) that relate to the coming, the life, and the death of Christ enable these *entia realia* to enter the soul, and thus prompt the deity in man to incline towards the saviour.<sup>50</sup>

50 Vaenius, *Conclusiones*, 42: ‘Per corpus, eius quinque organa, tum et per spiritum naturalem rationalem, [...] offeruntur animae variae formae, ac species, quae deinde movent Deitatem hominis ad inclinandum versus creatorem, aut a creatore [...] Per imagines enim, ceremonias ac significationes pias de adventu, vita, ac morte salvatoris, aliaque



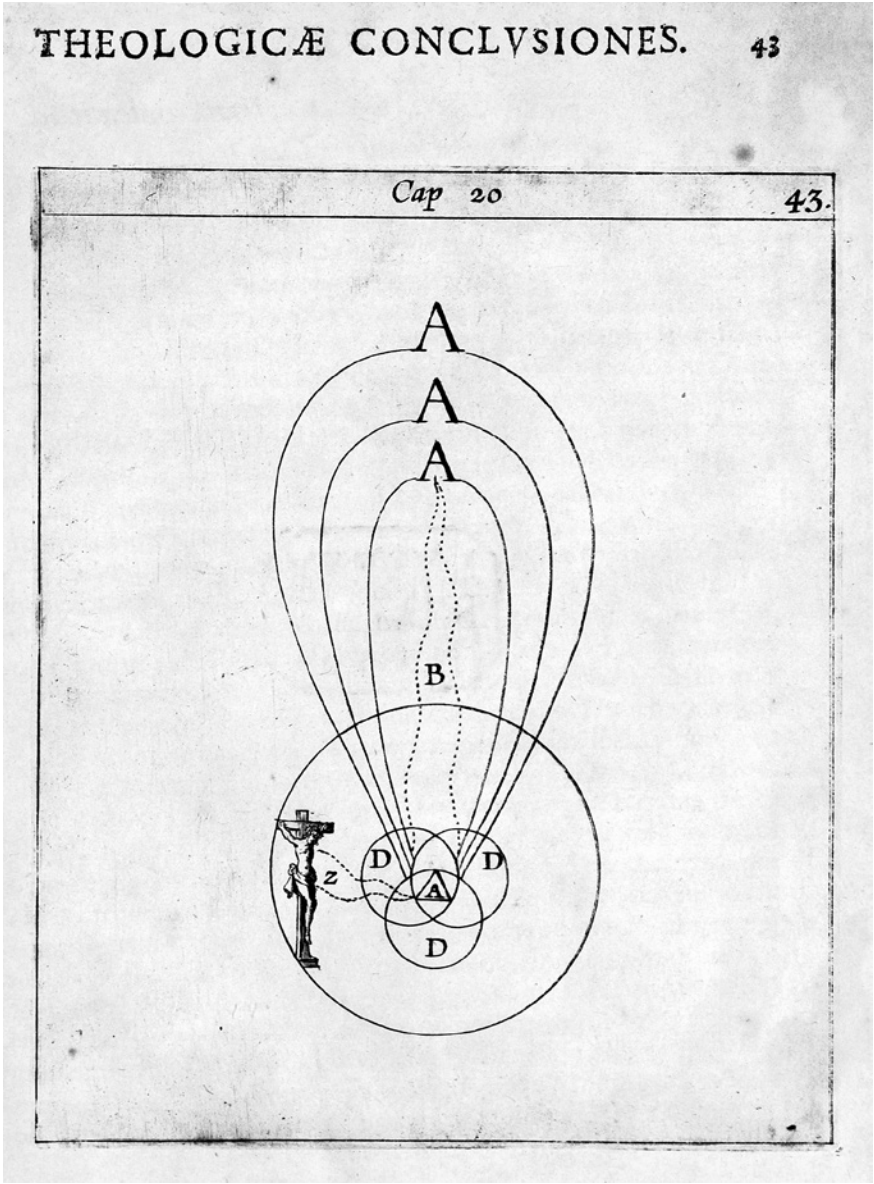


FIGURE 7.3 *Otto van Veen, De extremo iudicio et creaturarum resurrectione, engraving in Otto van Veen, Physicæ et theologicæ conclusiones (Orsellis: 1621) 34, London, British Library.*

This is illustrated (in a kind of meta-image, an image about the image) by the second and final mimetic representation in the book, after the allegory of *Ecclesia* in Chapter 19: the effigy of a crucifix linked by a ray (labelled Z) to the deity in man, where the ray stands for the bodily and spiritual flow of images into the soul. What can we infer from Chapters 14 and 20 as regards the question of the forces of the imagination applied not to the field of theology, but to the field of the visual arts, the very field practised by Vaenius? As far as we are able to reconstruct his ideas, Vaenius must have conceived of the artist as a man endowed both with a fertile imagination (able to produce numerous or remarkable *species*) and with manual and technical dexterity (enabling him to reproduce in matter, in a visible way, the products of his imagination—images which admittedly already have a body, but a body so subtle that it cannot be apprehended by the senses). In addition, Vaenius was acutely aware of the fact that artistic productions initiated an imaginative process in the person of the viewer, a process potent enough to bear on the soul's salvation; the artist's responsibility was thus far-reaching. In brief, the artist has the power to project and, in a sense, embody his imaginative creations, which can in turn exert their power on the beholder's imagination in order to allow him to incarnate in himself what is depicted.

To conclude with the *Conclusiones*: Chapters 14 and 20, the two chapters we have analysed, offer an essential interpretive key to the book. The entire treatise could be read through the lens of the issue of the relation of image to the imagination. The general purpose of the book is to demonstrate that man is free, responsible for his acts and for his salvation. The link between the question of freedom and the role of the imagination now appears more clearly: as man is an image of God, his freedom best reveals itself when he accomplishes this similitude to his Creator—and he does so by reproducing through his productive imagination the creative gesture of God. The imagination, far from being peripheral to the issue of free will, even constitutes one of its founding principles.

### The Imaginative Power of the Painter

This conception of the artist's power and freedom is strikingly epitomized in emblem 70 of Vaenius's *Emblemata Horatiana*, the first of his emblem books,

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innumera (quae entia sunt realia), quidam influere possunt per corpus et spiritum radij Z, adusque animam, tum & Deitatem hominis, illamque movere ad inclinandum versus salvatorem [...].'



FIGURE 7.4 Otto Van Veen, *Emblemata Horatiana* (Antwerp, J. Verdussen: 1607), Emblem 70, *Cuique suum studium*, engraving, Brussels, Royal Library of Belgium.

published in Antwerp in 1607 [Fig. 7.4]. Although not explicitly the topic of this emblem, the power of the imagination is nonetheless at its heart. The image shows a painter and a poet in the foreground. The painter is depicted with his back to the spectator, painting what appears to be a chimera on a canvas placed on an easel, while the laurel-crowned poet seated beside him gazes thoughtfully toward the canvas, holding his quill in his right hand, either about

to continue writing or having just stopped. Behind them stand two men, one of whom is holding up what looks like a urine flask that they both examine. In the background, several men bustle around a forge, striking anvils and working with fire. The motto accompanying the emblem, *Cuique suum studium* ('To everyone his own profession'), appears on the facing page, where it is followed by five quotations. Two are from Horace's *Epistles*; two from Greek comic dramatists known through fragments (Amphis and Hipparchus—in fact, Menander); and the final one is from Ovid's *Letters from the Black Sea*.<sup>51</sup> At Vaenius's behest, an eight-verse poem in French was added to the second edition. It comments directly on and explicates the engraving:

The painter has good knowledge of the colours,  
The poet, of the quill; the doctor,  
Of the urinal, and the blacksmith  
Has good knowledge of his anvil.  
On the contrary, he who

51 Horace, *Epistles*, I, 14, 44: *Quam scit uterque libens censebo exerceat artem* ('What I shall advise is that each contentedly practise the trade he understands') (Horace, *Satires, Epistles and Ars poetica*, trans. H. Rushton Fairclough, *The Loeb Classical Library* (London – Cambridge, Massachusetts: 1947) 340–341); Horace, *Epistles*, II, 1, 114–116: *navem agere ignarus navis timet; habrotonum aegro / non audet nisi qui didicit dare; quod medicorum est / promittunt medici; tractant fabrilis fabri* ('a man who knows nothing of a ship fears to handle one; no one dares to give southernwood to the sick unless he has learnt its use; doctors undertake a doctor's work; carpenters handle carpenters' tools') (ibid., 406–407). Amphis, fragment 3 (= Stob. IV, 18, 1) (*Poetae comici Graeci. vol. 2: Agathenor-Aristonymus*, ed. Kassel R. – Austin C. (Berlin – New York: 1991) 215); Latin translation as given by Vaenius: *Non est ullum humani infortunii / solatium dulcius in vita, quam ars: / Dum enim animus disciplinae vacat suae, / Laetanter praeternavigat et obliviscitur calamitates* ('There is no sweeter consolation in life for human misfortune, than art: indeed, while the spirit devotes itself to its discipline, it joyfully sails past and forgets its calamities', trans. A. Smeesters). Menander, fragment 68 (= Stob. IV, 18, 5) (*Poetae comici Graeci. vol. 6.2: Menander*, ed. Kassel R. – Austin C. (Berlin – New York: 1998) 78); Latin translation as given by Vaenius: *Paterna bona, tempus interdum facit / aliena, servans interim corpora: / Unum autem vitae praesidium in artibus situm est* ('Some occasion alienates your patrimony, while it spares, we'll say, your mere body; but secure livelihood exists in handicraft') (Menander, *The Principal Fragments*, trans. F.G. Allinson, *The Loeb Classical Library* (London – New York: 1921) 321).

Ovid, *Ex Ponto*, II, 9, 47–48: *adde, quod ingenuas didicisse fideliter artes / emollit mores nec sinit esse ferus* ('Note too that a faithful study of the liberal arts humanizes character and permits it not to be cruel') (Ovid, *Tristia. Ex Ponto*, trans. A. Leslie Wheeler, *The Loeb Classical Library* (London – New York: 1924) 362–363).

Dares trying his hand  
At someone else's job  
Rightly deserves to be corrected.<sup>52</sup>

A further quatrain added in the 1612 edition, also on Vaenius's prompting, slightly modifies the meaning of the engraving:

Some enjoy working the forge, some painting,  
Others enjoy biting their nails in order to write verse.  
The pleasures of men and their endeavours are varied,  
According to the variety of human nature.<sup>53</sup>

On the one hand, men should content themselves with doing what they know how to do well; on the other hand, each should follow his own nature, 'son génie en l'art ou la science', as a later edition says, and do what he enjoys most (in order to do it well). Propriety and decorum, or *aptum*, are key principles here, as regards expertise and inclination. Notably, these poems and quotations all praise art, which is not surprising, as we shall see.

The full meaning of the engraving is not, however, exhausted in the accompanying quotations and verses. The image contains other clues which, combined with the textual components, expand the implications of the emblem to encompass the status of the arts, specifically painting and poetry. To understand Vaenius's message, one should first recall the influence of Horace on considerations on painting and poetry. Indeed, the pairing of painting and poetry in the engraving evokes the *paragone* between these 'sister arts' thematized in the famous Horatian dictum, *Ut pictura poesis*, from *The Art of Poetry*. In spite of its centrality to the book as a whole—Vaenius paraphrases and expands on it in his preface—this quotation is absent from the texts accompanying the emblem under discussion. It is well known that early modern theorists and artists redefined the Horatian formula in support of claims regarding the liberal status of painting: the comparison was meant to favor painting, and the original 'Poetry will be like painting' became 'Painting will be like poetry'. The paraphrastic preface of the emblem book follows exactly this path: the

52 'Le peintre aux couleurs, à la plume / S'entend le poète, à l'urinal / Le médecin, le mareschal / S'entend au fait de son enclume. / Au contraire, celuy / Fait justement à reprendre / Qui s'avance d'entreprendre / Sur le métier d'autrui'.

53 'L'un se plait à la forge, l'autre à la peinture, / L'autre à ronger ses doigts pour composer des vers. / Le plaisir des humains et l'estude est divers / Selon que d'un chacun diverse est la nature'.

intention of the painter is to defend painting as a noble art, and the image as an equal of poetry.<sup>54</sup> This conditions perception of the emblem under discussion and initiates, as we shall see, an even more subtle claim.

In addition to the *Ut pictura poesis* quotation, which is latent in the emblem, and in addition to the fact that the figure at the easel faithfully reproduces the chimerical creature described by Horace, there is another key text, also (half) hidden; it appears as an inscription in the lower part of the canvas. Only its first word is unambiguously visible: '*Pictoribus*', the first word of verses 9 and 10 of *The Art of Poetry* ('*Pictoribus atque poetis quidlibet audendi semper fuit aequa potestas*'):

If a painter chose to join a human head to the neck of a horse, and to spread feathers of many a hue over limbs picked up now here now there, so that what at the top is a lovely woman ends below in a black and ugly fish, could you, my friends, if favored with a private view, refrain from laughing? [...] 'Painters and poets', you say, 'have always had an equal right in hazarding anything.' We know it: this licence we poets claim and in our turn we grant the like; but not so far that savage should mate with tame, or serpents couple with birds, lambs with tigers.<sup>55</sup>

This passage was often interpreted by painters as an assertion of the autonomy of their imagination, and their freedom to generate chimeras, as it were.<sup>56</sup> However, on Vaenius's engraving the continuation of the Horatian text is obscured by the engraved cross-hatchings that comprise the shadow of the painter's body on his canvas. (The work of the engraver is achieved in the shadow

54 Chatelain J.-M., *Livres d'emblèmes et de devises. Une anthologie (1531–1735)* (Paris: 1993) 136–137. On the difficult interpretation of this emblem, see Thøfner M., "Making a Chimera: Invention, Collaboration and the Production of Otto Vaenius's *Emblemata Horatiana*", in Adams A. – Van der Weij M. (eds.), *Emblems of the Low Countries. A Book Historical Perspective* (Geneva: 2003) 17–44, esp. 42–43.

55 Horace, *The Art of Poetry*, 1–5 and 9–13: 'Humano capiti cervicem pictor equinam / iungere si velit, et varias inducere plumas / undique collatis membris, ut turpiter atrum / desinat in piscem mulier formosa superne, / spectatum admissi risum teneatis, amici? / [...] / 'Pictoribus atque poetis / quidlibet audendi semper fuit aequa potestas'. / Scimus, et hanc veniam petimusque damusque vicissim; / sed non ut placidis coeant immitia, non ut / serpentes avibus gementur, tigris agni'. Translation: Horace, *Satires, Epistles and Ars Poetica*, trans. H.R. Fairclough 451.

56 Chastel A., "Le dictum Horatii: *quidlibet audendi potestas* et les artistes (XIII<sup>e</sup>–XVI<sup>e</sup> siècle)", *Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 121 (1977) 30–45.



FIGURE 7.5 Otto Van Veen, first preparatory drawing for emblem 70 of the *Emblemata Horatiana*, (Antwerp, J. Verdussen: 1607). The British Museum, London.

of the painter's work.) But it is precisely what is in the shadow that is most important and significant, and that gives the painting its soul, like the alchemical *opus magnum* evoked by the forge and the work with fire in the background. The preparatory drawing for this emblem reinforces the relevance of this alchemical allusion; here, the forge is the general setting for the overall scene, and work with fire is emphasized [Fig. 7.5]. The drawing also echoes Chapter 16 of the *Conclusiones*, where alchemical operations 'arte et igne' ('by art and fire') are described, while the 'doctors' in the engraving, scrutinizing a urine flask, might also be alchemists examining the result of an operation of the *opus*

*magnum*, carried out on the nearby fire. It is worth noting that in Vaenius's emblem, the painter occupies the primary position with respect to the poet. Alchemy pervades the *oeuvre* of Vaenius, and while he explicitly acknowledges his alchemical inspiration in the *Conclusiones*, he tends to conceal it elsewhere, as in his emblems.<sup>57</sup> But it is consistently associated with the work of the artist. As the *Conclusiones* makes clear, the power of the imagination is based on the Paracelsian conception of matter. As a consequence, the subtle association of the freedom of the artist's *inventio*, invoked by quoting Horace, with alchemical inclinations throughout Vaenius's *oeuvre* make it possible to understand emblem 70 of the *Horatiana* as an assertion of the power of the imagination thanks to the (nearly) absolute freedom of the artist. What is striking in Vaenius's engraving is, on the one hand, the materialization of Horace's chimera as the work of the painter, taking up the challenge contained in the Horatian inscription and, on the other hand, the strange likeness of this figure with the sphinx, the very form of the enigma. The work of the artist is thus mysterious by nature, and characterized by absolute freedom by virtue of the artist's access to an inner model, drawn from his imagination and expressed through an enigmatic chimera.

The disposition of the poet is likewise enigmatic, even if it also reads as anxious or melancholic, as in the poem added in 1612, which refers to the poet biting his fingers to make verses. Whatever his feelings, which we can only surmise, the intensity with which he gazes at the painting suggests fascination with, and even inspiration by, the powerful chimerical figure. This chimerical model is the manifestation of an interior idea, of the *disegno*, and is as such *mise en abyme* in the engraving. As the visual production of the painter Vaenius, it is both the manifestation of his conception of the painter and of the relationship between painting and poetry. Emblem 70 consists, then, of a series of embeddings. Not only does it embody the Horatian *paragone*, emphasizing the fascinating power of painting and the freedom of the imagination of the painter, but it also represents Vaenius's own gesture as a learned painter—a painter of speaking images and mute poetry, to which he attributes the highest secrets and truth.

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57 For an example of hidden alchemical inspiration in other emblems, see Guiderdoni A., "Modes de penser allégoriques au service des sciences au début du XVII<sup>e</sup> siècle: dire et masquer la nouveauté", in Rolet A. (ed.), *Allégorie et symbole: voies de dissidence? De l'Antiquité à la Renaissance* (Rennes: 2012) 430–431.



## Conclusion

A consistent theory of the imagination appears to underlie the literary and artistic production of Vaenius. The theory is fundamentally syncretic, mixing ancient, biblical, scholastic, and alchemical or Paracelsian references. None of the ingredients is original in itself, nor does any imply great erudition; but the *Conclusiones* offers a novel synthesis of all those elements, and proposes an intriguing and thought-provoking visual formalization of the theory, in the form of geometrical diagrams. The provocative dimension of Vaenius's theory lies in the density and efficiency he attributes to products of the imagination (in contrast to the role traditionally attributed to the *species*) and, more fundamentally, in an audacious anthropological conception which supposes the presence, within man, of supernatural powers by which he approximates Divinity. In many regards, Vaenius still belongs to the world of humanism and to the Renaissance episteme: he builds on a broad general knowledge based on the traditional pillars (the Ancients, the Bible, theological authorities); he is attracted by esotericism and syncretism, and endeavours to propose an 'universal theory' (to quote Rubens's letter); he insists on human dignity; he makes use of the *imago figurata* as a tool for the symbolical deciphering of the world. Nonetheless, some aspects of his approach, and in particular the recourse to geometry as a way of exposing the world's truths, already seem to portend the imminent epistemological revolution.

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# Sixteenth- and Seventeenth-Century Views on Mathematical Imagination

Guy Claessens

## Introduction

In the third chapter of his 1615 *De mathematicarum natura dissertatio*, Giuseppe Biancani (1566–1624), Professor of Mathematics at the Jesuit College of Parma, re-examines some of the major calumnies against mathematics expressed in the famous cinquecento and seicento methodological debate known as the *quaestio de certitudine mathematicarum*.<sup>1</sup> According to some, Biancani asserts, the intimate nexus between mathematics and imagination calls into question the discursive value and scientific status of the discipline:<sup>2</sup>

The fourth [calumny] is that mathematics, and especially geometry, depends on imagination rather than on discursive reasoning, and therefore is a science requiring the talents of a child, for children have a strong

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- 1 Biancani Giuseppe, *De mathematicarum natura dissertatio. Una cum clarorum mathematicorum chronologia*, published as an appendix to Biancani Giuseppe, *Aristotelis loca mathematica ex universis ipsius operibus collecta et explicata* (Bologna, Bartholomaeus Cochius: 1615). The title of the third chapter is: 'Recentiorum calumniae adversus mathematicas diluuntur' (Biancani, *Dissertatio* 19). With regard to this *quaestio*, see, among others, Jardine N., "Epistemology of the Sciences", in Schmitt C. – Skinner Q. (eds.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988) 685–712; De Pace A., *Le matematiche e il mondo. Ricerche su un dibattito in Italia nella seconda metà del Cinquecento* (Milan: 1993); Mancosu P., *Philosophy of Mathematics and Mathematical Practice in the Seventeenth Century* (New York – Oxford: 1996) 8–33; Feldhay R., "The Use and Abuse of Mathematical Entities", in Machamer P. (ed.), *The Cambridge Companion to Galileo* (Cambridge: 1998) 80–145. For a brief presentation of Biancani's views, see Helbing M.O., "La fortune des Commentaires de Proclus sur le premier livre des Éléments d'Euclide à l'époque de Galilée", in Bechtle G. – O'Meara D.J. (eds.), *La philosophie des mathématiques de l'Antiquité tardive, Actes du colloque international, Fribourg, Suisse (24–26 septembre 1998)* (Fribourg: 2000) 173–193, 180–183.
  - 2 Biancani's complaint is echoed by René Descartes (*Regulae ad directionem ingenii*, Regula IV, ATX 375, 10–22). See Mehl E., "L'essai sur Robert Fludd (1630)", in McKenna A. – Moreau F. (eds.), *Libertinage et philosophie au XVII<sup>e</sup> siècle 4* (Saint-Étienne: 2000) 85–119, 106 n. 60.

imagination. This is in agreement with the authority of Aristotle who, in the *Ethics*, book VI, chapter viii, asks: ‘How is it that a child can be a mathematician, but cannot be a wise man or a natural philosopher?’<sup>3</sup>

Contrary to what one might expect on the basis of the rest of the chapter, the intertext of Biancani’s statement is not Alessandro Piccolomini’s *Commentarium de certitudine mathematicarum*, a vigorous attack on the certainty of mathematical demonstrations dating from the 1540s.<sup>4</sup> Although Piccolomini (1508–1578) invokes the same passage from Aristotle’s *Ethics* to stress the ontological and epistemological simplicity and supremacy of the subject matter of mathematics (and, of course, the resulting weakness of its demonstrational methods), he does not mention the term ‘imagination’ once in this context.<sup>5</sup> Moreover, both in Piccolomini’s treatise and in Francesco Barozzi’s (1537–1604) subsequent response of 1560, the mathematical imagination referred to is explicitly and consistently termed *phantasia*, not *imaginatio*, and it plays a radically different role than in Biancani. For Piccolomini and Barozzi, the faculty of imagination corresponds to a full-fledged ontological level and provides the intelligible matter in which geometrical figures can exist.<sup>6</sup>

3 Biancani, *Dissertatio* 23: ‘Quarta est mathematicas, geometriam praesertim, consistere in imaginatione potius quam in discursu et proinde scientias esse puerilis ingenii, cum pueri valeant imaginatione. Accedit auctoritas Aristotelis qui sexto *Ethicorum* capite octavo ait, quid est, quod puer fieri mathematicus potest, sapiens aut naturalis non potest?’. I follow the translation of Gyula Klima, published as an appendix in Mancosu, *Philosophy of Mathematics* 178–212, with modifications. The passage referred to is Aristotle, *Nicomachean Ethics* 1142a16ff.

4 Piccolomini Alessandro, *Commentarium de certitudine mathematicarum disciplinarum*, published as an appendix to Piccolomini Alessandro, *In Mechanicas Quaestiones Aristotelis paraphrasis paulo quidem plenior* (Rome, Antonius Bladus Asulanus: 1547). Piccolomini is targeted *nominatim* throughout Biancani’s third chapter, see Biancani, *Dissertatio* 19, 20, 23, 25.

5 Piccolomini, *Commentarium* 107v–108r.

6 Barozzi Francesco, *Opusculum, in quo una Oratio et duae Quaestiones: altera de certitudine et altera de medietate Mathematicarum continentur* (Padua, E.G.P. [= Graciano Percacino]: 1560). Both Piccolomini and Barozzi borrow the term from the fifth-century Neoplatonist Proclus, who, in the double prologue to his *Commentary on the First Book of Euclid’s Elements*, developed a highly innovative philosophy of geometry. On Proclus’s concept of geometrical imagination, see Nikulin D., ‘Imagination and Mathematics in Proclus’, *Ancient Philosophy* 28, 1 (2008) 153–172. On Piccolomini’s and Barozzi’s use of *phantasia*, see Claessens G., ‘Clavius, Proclus, and the Limits of Interpretation: Snapshot-idealization versus Projectionism’, *History of Science* 47, 3 (2009) 317–336, 319–326.

Somewhat surprisingly, the source for Biancani's line of thought—including puerile *imaginatio*, mathematics, and the quotation from Aristotle—is a passage from the sixth book of Thomas Aquinas's commentary on Aristotle's *Nicomachean Ethics*.<sup>7</sup> Commenting on Aristotle's question as to why children can easily become mathematicians, Aquinas writes:

But the nature of mathematics is not obscure to them because mathematical proofs concern imaginable objects, while things pertaining to wisdom are purely rational. Youths can easily understand whatever falls under imagination, but they do not grasp things exceeding sense and imagination; for their minds are not yet powerful and trained for such considerations [...].<sup>8</sup>

That Aquinas's interpretation is invoked in the *Commentarii Collegii Conimbricensis*, a group of eleven commentaries on the works of Aristotle written by Jesuits at Coimbra, as an *argumentum ad auctoritatem* for the epistemological simplicity of the mathematical disciplines, clarifies the actual target of Biancani's criticism.<sup>9</sup> Indeed, Biancani fiercely attacks the *Conimbricenses* in the second chapter of his work for siding with Piccolomini on the matter of the (un)certainly of mathematical demonstrations; they are generally among Biancani's main adversaries in this seventeenth-century revaluation of the *quaestio*.<sup>10</sup>

7 Giacobbe calls this combination a 'distorted interpretation of Aristotle'. See Giacobbe G.C., "Epigoni nel Seicento della "quaestio de certitudine mathematicarum": Giuseppe Biancani", *Physis. Rivista internazionale di storia della scienza* 18, 1 (1976) 5–40, 27.

8 Aquinas, *Sententia libri Ethicorum*, lib. 6, lec. 1, 7 n. 16: 'sed circa mathematica non est immanifestum eis quod quid est. Cuius ratio est quia rationes mathematicorum sunt rerum imaginabilium, sapientialia autem sunt pure intellectualia; iuvenes autem de facili possunt capere ea quae sub imaginatione cadunt, sed ad illa quae excedunt sensum et imaginationem non attingunt mente, quia nondum habent intellectum validum et exercitatum ad tales considerationes [...]'. I follow the translation of Litzinger C.I., *Commentary on Aristotle's Nicomachean Ethics. St. Thomas Aquinas* (Notre Dame, Indiana: 1993) 384, with modifications. It is more than likely that, for the connection between mathematics and imagination, Aquinas relied on the views held by the Arabic Aristotelians. See Pines S., *Studies in Arabic Versions of Greek Texts and in Mediaeval Science* (Jerusalem: 1986) 369.

9 Collegium Conimbricense, *Commentariorum super octo libros Physicorum Aristotelis Stagiritae pars prima* (Venice, Andreas Baba: 1616) 28 [editio princeps 1592].

10 Biancani, *Dissertatio* 13: 'Post ipsum vero soli duo fere Pererius et Conimbricenses eum [sc. Piccolomineum] sequuti sunt'. On the Conimbricenses as the general target of Biancani, see Mancosu, *Philosophy of Mathematics* 16.

This chapter investigates two very different receptions of Plato's concept of εἰκασία in the context of cinquecento and seicento mathematical debates. In the first part, I will demonstrate that Biancani actually argues at cross-purposes with his alleged opponents. By interpreting the Latin word *imaginatio* as the equivalent of Plato's εἰκασία, which he understands in a very idiosyncratic manner, Biancani grossly misrepresents and misunderstands Aquinas's—and the Coimbrians'—claim regarding the use of imagination in mathematics. In the second part, I will show that one of Biancani's contemporaries, Jacopo Mazzoni (1548–1598), professor of Platonic and Aristotelian philosophy at the University of Pisa, displays a remarkably positive evaluation of Plato's concept of imagination; ironically, he stresses its scientific value in the domain of mathematics. Whereas Biancani emphasises the formal characteristics of Plato's concept of εἰκασία, i.e. its non-discursive character, to undermine its scientific value, Mazzoni focuses on its cognitive content, namely shadows and mirror images, to emphasise its discursive merit.

### Giuseppe Biancani's Mediocre Imagination

Biancani introduces the concept of imagination in the second chapter of the *dissertatio*, where he appeals to Plato's division of the sciences in Book VII of the *Republic* to refute those who invoke Plato's authority against mathematicians.<sup>11</sup> Biancani's reconstruction of Plato's argument runs as follows: Plato divides philosophy into (1) theology or dialectics, which he attributes to the intellect (*intellectus*), and which is deprived of hypotheses and discursive thought (*absque ulla suppositione et discursu*); (2) mathematics, which he places in discursive reasoning (*in cogitatione seu ratiocinatione*) and which accepts certain hypotheses (*principia supponit*);<sup>12</sup> and (3) 'opinion', which deals with natural objects and is situated in the imagination (*in imaginatione*).<sup>13</sup> The Latin terms *intellectus*, *cogitatio/ratiocinatio*, and *imaginatio*,<sup>14</sup> respectively, render

11 Plato, *Republic* 533c7–534a5.

12 I follow Klima in reading *cognitione* as a typographical error for *cogitatione*. See Mancosu, *Philosophy of Mathematics* 248 n. 8.

13 Biancani, *Dissertatio* 21.

14 In translating εἰκασία as *imaginatio* Biancani follows Ficino, whose *Epitome in dialogum septimum de iusto* is explicitly mentioned in the *dissertatio*, see Ficino Marsilio, *Opera et quae hactenus extitere et quae in lucem nunc primum prodire omnia* (Basel, Henricpetrina: 1576) vol. II, 1412. Nonetheless, the term is also rendered differently. Francesco Barozzi, for example, translates εἰκασία as *vis coniectandi*, see Barozzi Francesco, *Procli Diadochi Lycii philosophi Platonici ac mathematici probatissimi in primum Euclidis Elementorum librum*

the Greek terms νόησις, δῖάνοια, and εἰκασία.<sup>15</sup> However, Biancani appears to omit the Platonic concept of belief (πίστις), which in the domain of opinion (δόξα) still surpasses the apprehension of images and shadows (εἰκασία).<sup>16</sup> The notion of *imaginatio* is thus not associated with shadows and reflections in particular—as in the famous analogy of the Divided Line in Book VI—but with sensible objects *tout court*.<sup>17</sup> Imagination is, thus, sharply contrasted with intellect and discursive thought, since it pertains to the lowest realm of reality, namely sensible objects. Finally, Biancani stresses the fact that mathematics is intimately interwoven with discursive thought, whereas the cognitive status of imagination is not (yet) discussed. The reader is left with a very fuzzy concept of imagination, making it difficult to assess to what extent this concept resembles Plato's εἰκασία.

Biancani mentions imagination a second time when he addresses the fourth calumny, quoted above, stating that excessive dependence on imagination undermines the discursive value of mathematics. Imagination is again juxtaposed with discursive reasoning (*discursus*), and Book VII of the *Republic* again offers the pertinent context for interpreting the notion:

But listen to Plato in the same seventh book: “It is proper then—he says—to call the first part [of the Divided Line] science, the second one discursive thought, the third one belief, the last one imagination.” It is certain that the last two are situated by him in natural knowledge.<sup>18</sup>

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*commentariorum ad universam mathematicam disciplinam principium eruditionis tradentium Libri IIII* (Padua, Graciano Percacino: 1560), 6.

15 Ian Stewart rightfully argues that Biancani cannot have Proclus's notion of *phantasia* in mind, but Plato's ‘picture thought’. See Stewart I., “Mathematics as Philosophy: Barrow and Proclus”, *Dionysius* 18 (2000) 151–182, 171–172 n. 52.

16 See Plato, *Republic* 511e1–2.

17 Plato, *Republic* 509d6–511e5. Socrates here divides an imaginary line in two parts, respectively covering the intelligible and sensible realm. The first part is subdivided into Ideas and mathematical objects, whereas the second one is divided into sensible objects and their images (e.g. in shadows and mirrors). To each sublevel corresponds an epistemological faculty, respectively intellect (νόησις), discursive thought (δῖάνοια), belief (πίστις), and the apprehension of images and shadows (εἰκασία).

18 Biancani, *Dissertatio* 23: ‘Sed audi Platonem in eodem septimo. Placet igitur, ait, primam partem vocare scientiam, secundam cogitationem, tertiam fidem, postremam imaginationem. Constat autem ultimas duas ab ipso collocari in naturali peritia’. = Plato, *Republic* 533e7–534a1.



From Biancani's perspective, imagination—here, joined by belief (*fides*)—pertains to the field of natural philosophy (*imaginatio circa naturalem philosophiam* [versatur]), and clearly ranks below the discursivity at work in mathematics. Biancani elaborates briefly on the concept of discursive reasoning, invoking the authority of the fifth-century Neoplatonist Proclus, who followed Plato in calling *cogitatio* 'the appropriate instrument for judging all mathematical things' (*instrumentum aptum ad iudicandum cunctas res mathematicas*).<sup>19</sup> Moreover, according to Biancani, the meaning of the Greek νόηματος (sic) and the Latin *cogitatio*—from *coagitatio*, he maintains—demonstrates that *cogitatio* is a certain movement of the mind (*motus mentis*) synonymous with discursive thought (*discursus*).<sup>20</sup> But who needs arguments from authority, Biancani asks, when it is obvious that geometrical demonstrations require discursive thought rather than 'mediocre imagination' (*mediocris imaginatio*)? Euclid's work comprises a magnificent chain of interconnected consequences and ingenious inferences, countless in number. What role could the puerile imagination possibly play, as it is entirely deprived of discursivity (*omnis illationis expers prorsus est imaginatio*)? Biancani's conclusion is crystal-clear: mathematics and imagination are irreconcilable.

The Jesuit arrives at this conclusion by way of a close reading of a relatively short passage from Book VII of the *Republic*. Remarkably enough, Biancani nowhere refers to the analogy of the Divided Line in Book VI—which this passage recapitulates. The absence of this overarching framework both in the text itself and in Biancani's explication of the passage explains all the peculiarities of his reception of Plato's εἰκασία. In this regard, the crucial differences between Books VI and VII of the *Republic* are threefold: (1) At the end of Book VI, the different ontological levels—shadows/reflections, plants/animals/artefacts, mathematical objects, ideas—are specified, whereas Book VII only cites the opposition between being and becoming.<sup>21</sup> In general, the passage from Book VII focuses on methodology and scientific value rather than ontology—obviously a convenient approach in the context of the *quaestio*. (2) In Book VII, imagination is not discussed in relation to shadows or reflections, but only connected to opinion (δόξα) and the realm of becoming (γένεσις). (3) The passage from Book VII ends with Socrates's assertion that

19 Biancani quotes Proclus, *Procli diadochi in primum Euclidis elementorum librum commentarii* 11, 26–12, 2.

20 For the link between *cogitatio* and *coagitatio*, see Sextus Pompeius Festus, *De verborum significatu* 58, 6–7. The association of *cogitatio* and νόηματος does not make any sense. The only Greek word that would make sense is of course διάνοια.

21 Plato, *Republic* 534a1–2.

discursive reasoning is to imagination as intellect is to opinion, and science to belief.<sup>22</sup>

In my opinion, Biancani singles out the dichotomy between being and becoming as pivotal, and this opposition underpins his account. Imagination thus becomes the antipode of discursivity, belonging to opinion and the world of becoming. Imagination's ontological correlates—the images of shadows and mirrors—are either unknown to Biancani or simply irrelevant. Apart from the question of whether or not Biancani does full justice to the Platonic notion of εἰκασία, it remains to be seen whether Aquinas—and the Coimbrans who appeal to the *doctor angelicus*—have a similar concept of imagination in mind when describing ‘childish’ mathematics.

Aquinas briefly explores the function of imagination in mathematics when discussing the potential use of imagination in theology in his *Super Boetium de Trinitate*.<sup>23</sup> Of every kind of knowledge, Aquinas says, the beginning and the end should be taken into consideration: knowledge starts with understanding (*apprehensio*) and concludes with judgment (*iudicium*). Every form of knowledge begins with apprehension by means of the senses, which precedes imaginative and intellectual understanding. But the end point is not always the same: sometimes knowledge ends in sense perception, sometimes in imagination, and sometimes in the intellect. After all, in some cases the features shown to the senses adequately express an object's nature. In that case, judgment by the intellect has to correspond to what is demonstrated by the senses—which is the terrain of natural philosophy. However, judgment about other objects is not dependent on sense perception. Although these objects exist in sensible matter, their essence is determined without reference to sense perception:

and since, when the sensible conditions are removed, something imaginable remains, it is necessary in these cases that a judgment is given in accordance with what imagination demonstrates. Mathematics is of this kind.<sup>24</sup>

<sup>22</sup> Plato, *Republic* 534a3–5.

<sup>23</sup> Aquinas, *Super Boetium de Trinitate*, pars 3, q. 6 a. 2. For a concise treatment of Aquinas's concept of mathematical imagination, see Winance E., “Note sur l'abstraction mathématique selon saint Thomas”, *Revue philosophique de Louvain* 53, 40 (1955) 482–510, esp. 489–490.

<sup>24</sup> Aquinas, *Super Boetium*, pars 3, q. 6 a. 2, co. 3: ‘et remotis sensibilibus condicionibus remanet aliquid imaginabile, ideo in talibus oportet quod iudicium sumatur secundum id quod imaginatio demonstrat. Huiusmodi autem sunt mathematica’.

This particular use of the mathematical imagination is exactly what Aquinas has in mind when he refers to mathematical proofs (*rationes*) as dealing with objects that can be imagined (*res imaginabiles*). Put differently: since geometrical demonstrations deal with objects and, by extension, constructions that can be imagined, they are very easily picked up by children, who are well versed in using imagination. Aquinas thus mainly calls upon the concept of *imaginatio* from a hermeneutical and epistemological perspective, namely to reveal—and, accordingly, judge—an additional dimension or layer of reality. According to Aquinas, the mathematician's imagination shows and assesses the world without taking sensible matter into account, yet this 'abstraction' introduces no falsity whatsoever (*abstrahentium non est mendacium*).<sup>25</sup> On the contrary: the mathematical imagination creates its own complementary world and matching laws. In this world—to use a medieval commonplace that allegedly traces back to Protagoras—a straight line touches a sphere at exactly one point.<sup>26</sup>

Aquinas's mathematical imagination diverges substantially from the puerile and interfering toy described by Biancani, and bears no similarities to the Platonic concept of *εἰκασία* upon which Biancani's interpretation is ultimately based. Although Aquinas's imagination is *in se* deprived of discursivity and on a level below the intellect, it provides the latter with the images of a reality that has to be judged in its own right. It is a complementary tool rather than an antagonistic hindrance. By interpreting Aquinas's *imaginatio* from the perspective of Plato's *εἰκασία*, Biancani misses and misrepresents the Dominican's point. There is, however, a third way to conceive of the relation between discursivity and imagination: not as opposites, or complements, but as quasi-synonyms. This approach is found in Jacopo Mazzoni's *De comparatione Platonis et Aristotelis*, which is the subject of the second part of this chapter.

### Jacopo Mazzoni's Science of Shadows

The views of Jacopo Mazzoni, alumnus of the university of Padua and professor of Platonic and Aristotelian philosophy at Pisa from 1588 until 1597, are immediately pertinent here.<sup>27</sup> Mazzoni's concept of imagination is generally held

25 Aquinas, *Super Boetium*, pars 3, q. 5 a. 3, ad 1. For the origin of the dictum 'abstrahentium non est mendacium', see Aristotle, *Physics* 193b34–35.

26 For the source of this tradition, see Aristotle, *Metaphysics* 997b34–998a6.

27 Crombie A.C., *Science, Art and Nature in Medieval and Modern Thought* (London: 1996) 197–198.

to be exemplary of a changing attitude towards the use of mathematical demonstrations in the domain of natural philosophy, making the philosopher from Cesena the first to open up Plato's obscure realm of shadows and reflections to the method of mathematical demonstration.<sup>28</sup> Moreover, Mazzoni's pioneering imagination is allegedly grounded in a Platonic ontology of mathematics.<sup>29</sup> In what follows, I will demonstrate that Mazzoni's notion of imagination is not as straightforward as it seems and that it should be approached more cautiously, especially when it comes to its ontological backdrop.

Mazzoni's most extensive discussion of the link between imagination and mathematics appears in the seventeenth book of his ambitious and voluminous *In universam Platonis et Aristotelis philosophiam praeludia sive de comparatione Platonis et Aristotelis* (Venice, 1597).<sup>30</sup> This work offers a comparison between the views of Plato and Aristotle on the preliminary education for philosophers *in spe*.<sup>31</sup> According to Mazzoni, one of the fundamental differences between the thinkers concerns the status of science or knowledge (*scientia*) on the educational ladder.<sup>32</sup>

The first difference is that Aristotle does not turn preliminary education into a disposition different from science. But Plato has a dissenting opinion, when he posits three dispositions—namely, imagination with respect to shadows, belief with respect to bodies, and understanding with respect to mathematical objects—as preparatory to science.<sup>33</sup> Indeed, for Plato, dialectic is the only science worthy of the name, and natural philosophy and mathematics can at best play a propaedeutic role (cf. *supra*). In what follows, Mazzoni not

28 Galluzzi P., "Il 'Platonismo' del tardo Cinquecento e la filosofia di Galileo", in Zambelli P. (ed.), *Ricerche sulla cultura dell'Italia moderna* (Bari: 1973) 37–79, 68; De Pace, *Le matematiche* 315ff; Angelini A., "Un autre ordre du monde": Science et mathématiques d'après les commentateurs de Proclus au Cinquecento", *Revue d'histoire des sciences* 59, 2 (2006) 265–283, 268.

29 De Pace, *Le matematiche* 315 and Angelini, "Un autre ordre du monde" 271.

30 Mazzoni Jacopo, *In Universam Platonis et Aristotelis Philosophiam Praeludia, sive de Comparatione Platonis et Aristotelis* (Venice, Johannes Guerilius: 1597) 176ff. For a modern edition of the work, see Iacobi Mazzonii, *In universam Platonis et Aristotelis philosophiam Praeludia, sive de Comparatione Platonis et Aristotelis* ed. S. Matteoli (Naples: 2010).

31 The title of the seventeenth book reads: 'Comparatur purgatio praeparans Platonis cum paedia praeparante Aristotelis'. (Mazzoni, *De comparatione* 176).

32 Cf. Galuzzi, "Il 'Platonismo'" 68.

33 Mazzoni, *De comparatione* 180: 'Prima est quod Aristoteles non facit paediam praeparantem diversum habitum a scientia. Verum Plato contrarium opinatur, quandoquidem tres habitus ponit, idest imaginationem circa umbras, fidem circa corpora, cogitationem circa mathemata, ut praeparantes ad scientiam'.

only agrees with Aristotle—in what amounts to calling mathematics a proper science—but also uncovers a flaw in Plato's account.<sup>34</sup> According to Plato, imagination and discursive thought are radically different dispositions: imagination is a non-discursive apprehension of shadows and reflections in water and mirrors, whereas discursive apprehension is a discursive faculty dealing with mathematical objects and making use of mathematical demonstrations (cf. *supra*). However, as Mazzoni argues in a four-page *digressio de modo Platonico transeundi ab umbris ad corpora*, if one has to make the Platonic ascent from shadows to physical bodies, one will need the help of mathematical objects and demonstrations.<sup>35</sup> In addition, even if one wished to descend from physical objects to their reflections, it would not be possible without mathematics. With regard to the upward movement, Mazzoni gives the example of Eratosthenes, who was able to calculate the circumference of the earth based on the shadow of a sundial.<sup>36</sup> Having provided us with a detailed, technical explanation of Eratosthenes's calculations, Mazzoni concludes with a sneer at Plato:

Who does not see that Eratosthenes in that progression has passed from shadows to body and its property? No one for sure. And yet that egression, which according to Plato belongs to the first kind of preparatory cleansing, must be entirely attributed to mathematical demonstrations.<sup>37</sup>

According to Mazzoni, this type of demonstration proceeds from shadows to bodies by means of mathematical objects (*per mathemata*).<sup>38</sup> As far as the downward movement is concerned, Mazzoni refers to the use of the sun's elevation in calculating the length of a shadow.<sup>39</sup> The observation that the transition back and forth between shadows and physical objects is completed by means of mathematical demonstrations leads Mazzoni to the following

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34 Ibid. 180: 'Quoad primam itaque differentiam dicimus Aristotelis opinionem magis veritati et rectae rerum rationi consentire'.

35 Ibid. 180–183.

36 Ibid. 180.

37 Ibid. 181: 'Quis non videt in isto progressu Eratosthenem quidem ab umbris ad corpus illiusque proprietatem transisse? Certe nemo. Et tamen egressus iste, qui iuxta Platonem ad primam purgationis praeeparantis speciem pertinet, tantus quantus est mathematicis demonstrationibus adscribi debet'.

38 Ibid. 182.

39 Ibid. 182.

conclusion, which is often quoted to stress the originality of Mazzoni's concept of imagination:<sup>40</sup>

From all these things, everyone can clearly see that imagination is not a different disposition from discursive thought, since both arrive at their conclusions by means of mathematical objects.<sup>41</sup>

True, scientific knowledge of the sensible world can be arrived at by means of a discursive, mathematical imagination. That Mazzoni's interpretation of the Platonic εἰκασία bears important consequences for the relation between mathematics and the study of the sensible realm is beyond doubt. The question, however, is whether or not this original take on the notion of εἰκασία should be framed in a Platonic ontology of mathematical objects as well, as some scholars claim.<sup>42</sup> According to Anna De Pace, the novelty of Mazzoni's interpretation of Platonic εἰκασία can only be fully grasped when it is connected to the Platonic theory of knowledge presented and, more specifically, to the phrase 'per eas promendo imagines similes obiecto excitanti', in the previous book of *De comparatione*.<sup>43</sup>

Book XVI of *De comparatione* offers a detailed comparison between Plato's and Aristotle's views on the faculty of judgment (*criterium*) at work in the different branches of knowledge.<sup>44</sup> One of its main conclusions is that Plato is correct in stating that the only valuable criterion in mathematics is reason, even if it goes against the evidence of our senses.<sup>45</sup> Mazzoni thus finds Plato conveniently authorizing the views of the Jesuit natural philosopher Benito Pereira (1535–1610), who had grounded the certainty of mathematics on the accuracy of its method and whose opinion is shared—at least partially—by

40 Galuzzi, "Il 'Platonismo'" 68; De Pace, *Le matematiche* 318 and Angelini, "Un autre ordre du monde", 267, 276.

41 Mazzoni, *De comparatione* 183: 'Ex istis omnibus potest unusquisque manifeste videre imaginationem non esse diversum habitum a cogitatione, quandoquidem uterque ex mathematicis ad suas conclusiones progreditur'.

42 E.g. De Pace, *Le matematiche* 316 and Angelini, "Un autre ordre du monde" 271.

43 De Pace, *Le matematiche* 315.

44 Mazzoni defines the term *criterium* as follows: 'Est ergo criterium, idest iudicatorium vis et facultas animi quaedam, quae habitu logico, ut demonstrabimus, instructa, scientiae methodum atque ordinem metitur vel, ut melius dicam, constituit'. (Mazzoni, *De comparatione* 156).

45 Ibid. 176: 'Nam (ut probatum est) in mathematicis ratio sola criterium est, et interdum repugnante sensu. [...] quoad mathematica vero criterium Platonicum anteponitur'.

Mazzoni.<sup>46</sup> It is against this background that the Platonic theory of the genesis of knowledge in Book XVI is to be read, i.e. as a doxographical account explaining Plato's theory of knowledge, and not as a presentation of Mazzoni's personal views on the matter.<sup>47</sup>

In order to reconstruct Plato's ideas on sense perception and the genesis of knowledge, Mazzoni turns to the work of Francesco Piccolomini, Professor of Natural Philosophy at the University of Padua from 1565 until 1598.<sup>48</sup> In his *Universa philosophia de moribus* (Venice, 1583),<sup>49</sup> he provided sixteenth-century readers with a so-called Platonic theory of knowledge (*cap. XXIX. Quomodo in nobis scientia producat, opinio Platonis*).<sup>50</sup> Piccolomini's theory is in fact, as I shall argue, almost entirely based on pseudo-Simplicius's treatment of the matter in his commentary on Aristotle's *De anima*.<sup>51</sup> *Caveat lector*: in order to elucidate Plato's ideas on the genesis of knowledge, Mazzoni paraphrases Piccolomini's account, which in turn is mainly inspired by pseudo-Simplicius.

Mazzoni's multilayered account goes as follows. When the sense organs are stimulated, the formative capacity of the soul (*facultas formans*) renders that affection more pure and less corporeal (*purior ac spiritalior*). Almost simultaneously, another capacity—called the *facultas utens*, as it “uses” the sense

46 Ibid. 164: ‘At mathematicus non curans evidentiam secundum sensum, et eius iudicia licet clara et certa contemnens, omnia revocat ad incudem cunctaque ad exactissimam rationis iudicantis normam exigens, nihil praeterit sine firma demonstratione atque menti perspicua’. Mazzoni copies this passage almost *verbatim* from Pereira Benito, *De communibus omnium rerum naturalium principii et affectionibus libri quindecim* (Rome, Franciscus Zanettus – Bartholomaeus Tosius: 1576) 32. For Mazzoni's dependence on Pereira, see Purnell F. Jr., ‘Jacopo Mazzoni and Galileo’, *Physis. Rivista Internazionale di storia della scienza* 14 (1972) 273–294, 277.

47 In the table of contents, the discussion of the Platonic theory of knowledge is explicitly framed as *opinio Platonis*, e.g. *Anima progressa, ut excitetur apud Platonem* and *Imaginatio assimilatrix et phantastica quatenus apud Platonem* (Mazzoni, *De comparatione* 170).

48 Mazzoni openly mentions Piccolomini as the source for (part of) his account, and refers to the latter's *Universa philosophia de moribus* (Mazzoni, *De comparatione* 175). Remarkably enough, this reference has escaped the attention of scholars evaluating Mazzoni's theory of imagination. On Piccolomini, see Kraye J., ‘Francesco Piccolomini’, in Kraye J. (ed.), *Cambridge Translations of Renaissance Philosophical Texts. Volume 1. Moral Philosophy* (Cambridge: 1997) 68–88 and Schmitt C. – Skinner Q. (eds.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988) 831.

49 Piccolomini Francesco, *Universa philosophia de moribus* (Venice, Franciscus de Franciscis Senensis: 1583).

50 Piccolomini, *Universa philosophia* 445ff.

51 E.g. pseudo-Simplicius, *in de An.*, 165, 33ff., *Ibid.*, 208, 12ff., *Ibid.*, 213, 25ff, *Ibid.*, 233, 6ff.

organs as its instrument—projects the corresponding sensible species in accordance with an innate concept (*ratio*).<sup>52</sup> The same faculty then connects the species with the matching concept and produces a judgment.<sup>53</sup> For example, the soul perceives all particular white things by means of one single concept of whiteness.<sup>54</sup> Sense perception is therefore both passive and active.

Subsequently, we move from the external to the internal senses: by means of concepts of a higher order, the perceived species are judged at a higher level. First, we have imagination (*imaginatio*), which has a twofold nature: imagination is assimilative (*assimilatrix*) when it merely receives data from the external senses, and imaginative (*phantastica*) when it judges something as good or bad or when it forms new images (*phantasmata* and *simulachra*) at will.<sup>55</sup> After imagination follow belief (*fides*), opinion (*opinio*), discursive thought (*cogitatio*), and, finally, pure understanding (*intelligentia*).<sup>56</sup>

Hence, the innate concepts can be used in three ways.<sup>57</sup> Firstly, the soul can, with the aid of concepts, project images that are similar to the stimulating object (*per eas promendo imagines similes obiecto excitanti*), and subsequently judge the object in question. In this case the soul moves outward and is already stimulated: this is the domain of imagination, belief, and opinion. Secondly, the soul can remain in itself, project the concepts, and examine them as its own object. According to Mazzoni, this is the level of discursive thought (*cogitatio*) and mathematical objects (*mathemata*). Thirdly, the inborn concepts enable the soul to ascend to the ideas in the intellect. In this phase, the soul has returned, as it were, to pure understanding (*intelligentia*).<sup>58</sup>

Clearly, a strong similarity pertains between Mazzoni's model and the Divided Line from the *Republic*, but for a number of reasons, the notion of *imaginatio* does not seem to tally with Plato's idea of εἰκασία. Firstly, imagination is placed among the internal senses and seems to incorporate different functions within a so-called faculty psychology—namely, the *virtus imaginativa*, which retains an image in the absence of a sensible object; the *virtus aestimativa*, which judges something as friend or foe; and the *virtus phantastica*,

52 This is Piccolomini's rendering of pseudo-Simplicius's ἡ χρωμένη ζωή. See pseudo-Simplicius, *in de An.*, 166, 23.

53 Mazzoni, *De comparatione* 175.

54 The example is taken from pseudo-Simplicius, *in de An.*, 126, 11–12.

55 Mazzoni, *De comparatione* 175.

56 Ibid. 175.

57 Ibid. 175–176.

58 Ibid. 176.



which creates new images.<sup>59</sup> Secondly, imagination's double capacity is strongly reminiscent of a passage from Plato's *Sophist* that distinguishes between two sorts of mimetic/image-making art: the art of copying (εἰκαστική τέχνη) and the art of producing appearances (φανταστική τέχνη). The first produces likenesses according to the proportions of the original, whereas the second creates mere appearances (φαντάσματα). Although the latter appear from the perspective of the spectator to be beautiful and in proportion, they are in reality disproportionate.<sup>60</sup> Thirdly, although mathematical objects and ideas are mentioned as the objects of discursive thought and intellect, respectively, and sensible objects are referred to as the incentives of the whole process of recollection, the ontological category of shadows and reflections is not mentioned.

In order to assess the novelty of Mazzoni's notion of εἰκασία, let us turn to De Pace's claim that Mazzoni integrates this concept into a Platonic theory of mathematical objects (cf. *supra*). Indeed, in Book XVI of *De comparatione*, the soul—when active in the domain of imagination, belief, and opinion—is said to project images by means of innate concepts. According to De Pace, this is exactly what happens when εἰκασία deals with shadows and reflections, as discussed in Book XVII of *De comparatione*.<sup>61</sup> From this perspective, the innate concepts are mathematical demonstrations that enable us to project images of sensible objects while studying shadows or reflections.

For a correct understanding of this act of projection we should, however, turn to pseudo-Simplicius's commentary on Aristotle's *De anima*. In his discussion of Aristotle's concept of φαντασία, pseudo-Simplicius describes how imagination uses the soul's innate concepts to project images that resemble sensible objects:

and the imagination itself is stimulated to put forward imaginative impressions in accordance with the appropriate reason-principles and in a way appropriate to the perceptual forms, sometimes needing the perceptual impressions for putting forward similar ones.<sup>62</sup>

59 On the status of imagination as a faculty of the sensitive soul, see Park K., "The Organic Soul", in Schmitt C.B. – Skinner Q. (eds.), *The Cambridge History of Renaissance Philosophy* (Cambridge: 1988), 464–484 and Meier C., "Imaginatio und phantasia in Enzyklopädien vom Hochmittelalter bis zur Frühen Neuzeit", in Dewender T. – Welt T. (eds.), *Imagination – Fiktion – Kreation. Das kulturschaffende Vermögen der Phantasie* (Munich – Leipzig: 2003), 161–181.

60 Plato, *Sophist* 236b4–236b7.

61 De Pace, *Le matematiche* 315–316.

62 Pseudo-Simplicius, *in de An.*, 213, 27–214, 8: 'καὶ αὐτὴ ἡ φαντασία ἐγείρεται πρὸς τὴν κατ' οἰκείους λόγους τῶν φανταστικῶν τύπων προβολὴν οἰκείως τοῖς αἰσθητικοῖς εἶδεσιν, οὐχ ἄπαξ ἢ

In my opinion, this is the proper context for interpreting Mazzoni's (and Piccolomini's) description of the soul projecting an image resembling a stimulating object. By means of innate concepts—which are not mathematical demonstrations—the soul (in this case the faculty of imagination) (re)produces images similar to sensible objects. In the sequence *imaginatio/fides/opinio*, imagination more closely resembles the Aristotelian faculty of φαντασία than the Platonic notion of εἰκασία. For that reason, one has to be careful in transposing this concept from the sixteenth to the seventeenth book of *De comparatione*. As stated above, when Mazzoni discusses his science of shadows in Book XVII, the concept of *imaginatio* is explicitly linked to the ontological content of Plato's εἰκασία, and there is no trace whatsoever of a projective φαντασία. The fact that εἰκασία, defined as the level of apprehension concerned with the images of sensible objects, arrives at its conclusion by means of mathematical demonstrations has nothing to do with the observation that φαντασία, defined as a faculty of the internal senses, projects images by means of innate concepts.

The identification by Mazzoni of εἰκασία and φαντασία would imply that he considers mathematical concepts innate, as is explicitly stated by both Angelini and De Pace (cf. *supra*). But when we examine Mazzoni's own views on mathematics, they appear to be far from Platonic. Concerning the true division of the sciences (*vera scientiarum divisio*), Mazzoni provides us with the following hierarchy:<sup>63</sup>

After all, the object that philosophy examines is either concerned with matter and motion—and makes up physics—or separate from matter and motion. And if it is separate, it is [separate] either only according to reason—and it then comprises mathematics—or both in reality and according to reason, and is called the object of the first philosophy or metaphysics.<sup>64</sup>

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δὲς ἐνίοτε μόνον τῶν αἰσθητικῶν δεηθεῖσα τύπων ἀλλὰ καὶ πλεονάκεις πρὸς τὴν τῶν ὁμοίων προβολήν'. I follow the translation of Blumenthal H.J., 'Simplicius'. *On Aristotle's "On the Soul" 3.1–5* (Ithaca – New York: 2000) 73. Cf. Ibid. 165, 30ff.

63 The same hierarchy of the speculative sciences is read *passim*, e.g., Mazzoni, *De comparatione* 186.

64 Mazzoni, *De comparatione* 158: 'Obiectum enim, quod philosophia rimatur, vel est concernens materiam et motum et constituit physicam, vel abiunctum a materia et a motu. Atque si est abiunctum, vel ratione tantum et constituit mathematicam, vel re et ratione et primae philosophiae seu metaphysicae obiectum dicitur'.

This is in fact the standard division of the different branches of speculative philosophy, stemming from Aristotle.<sup>65</sup> Since the objects of mathematics are only separated from the sensible realm mentally, mathematics acts as a convenient bridge between physics and metaphysics.<sup>66</sup> In his comparison of the mathematical ontologies of Plato and Aristotle, Mazzoni thus appears to defend the Stagirite's abstractionism at the expense of the Athenian's innatism. Moreover, Mazzoni uses the Aristotelian account of mathematical abstraction to buttress his position in the wider debate on the demonstrative power of the mathematical disciplines: by abstracting from matter and motion, mathematics also abstracts from efficient, material, and final causation.<sup>67</sup> And, Mazzoni continues, since mathematics can also be shown to ignore the formal cause, its demonstrations do not involve any of the Aristotelian causes at all, which confirms the stance adopted by Benito Pereira (cf. *supra*).<sup>68</sup>

In sum, the gist of Mazzoni's argument in Books XVI and XVII may be summarized as: (1) discursive thought is the only valuable criterion in mathematics; (2) mathematics is a science; and (3) Plato is wrong in stating that apprehension by means of shadows does not yield true knowledge, since it follows the same *mathematical* method as discursive thought. From Mazzoni's perspective, for all these reasons, the use of mathematics in the study of the physical world is legitimate. This is indubitably an important claim in the context of the sixteenth-century *quaestio de certitudine mathematicarum*. I do not think, however, that this original point of view is framed within an overarching Platonic ontology of mathematical objects.

## Conclusion

The shifting and equivocal meaning of the concept of imagination through different historical periods and across various disciplines or discursive formations is well documented.<sup>69</sup> However, its ambiguous meaning within the field

65 See Aristotle, *Physics* 193b22–194b9 and *Metaphysics* 1026a13–1026a19. On the history of this classification, see Weisheipl J., "Classification of the Sciences in Medieval Thought", *Mediaeval Studies* 27 (1965) 54–90.

66 Mazzoni, *De comparatione* 186. See Purnell, "Jacopo Mazzoni" 283.

67 Mazzoni, *De comparatione* 158.

68 Ibid. 158. See Purnell, "Jacopo Mazzoni" 276–277.

69 See a.o. Bundy M.W., *The Theory of Imagination in Classical and Mediaeval Thought* (Urbana: 1928); Fattori M. – Bianchi M. (eds.), *Phantasia ~ imaginatio. V° Colloquio internazionale* (Rome: 1988); Cocking J.M., *Imagination. A Study in the History of Ideas* (London – New York: 1991); Dewender T. – Welt T. (eds.), *Imagination, Fiktion, Kreation:*

of sixteenth- and seventeenth-century mathematics is generally overlooked. The different types of imagination discussed before—ranging from Biancani's and Mazzoni's transformations of Plato's εἰκασία to Aquinas's views, and from the Coimbrians' puerile *imaginatio* to Neoplatonic *phantasia*—demonstrate that the idea of a single, well-delineated concept of mathematical imagination will only lead to misunderstandings, as much today as in the sixteenth and seventeenth centuries. Although the usual model for the post-medieval mathematical imagination is Proclus's Neoplatonic concept of φαντασία, the case studies explored here demonstrate that the more obscure notion of εἰκασία played an important role as well. Of course, the fact that Plato devotes only a couple of sentences to this vague 'apprehension of *or* by means of images and shadows',<sup>70</sup> turns this notion into a malleable concept suitable for multiple opposing perspectives. Biancani, who reads the concept only in the context of Book VII of the *Republic*, underlines its methodical opposition with discursive thought and fails to recognise its ontological content. Mazzoni, on the contrary, uses its involvement with shadows and images as a proof of its discursive nature, and in so doing even reproves Plato himself. Both, however, make use of Plato's authority in defending and promoting mathematics, with or without imagination.

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70 Liddell H.G., Scott R., Jones H.S. et alii, *A Greek-English Lexicon* (Oxford: 1969), s.v. "εἰκασία".

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# What Does a Diagram Prove that Other Images Do Not? Images and Imagination in the Kepler-Fludd Controversy

Christoph Lüthy

*Hæc figura docet* ('this image teaches [...]') is a phrase we encounter often in early modern works. But can an image 'teach'? Assume it can; why, then, is what it 'teaches' not expressed more easily in words? And why, in order to 'teach', should a text and its author defer to images at all? Is it possible that an image adds something to verbal argument, or can it 'teach' things that words cannot?

## The Elusive Role of Early Modern Epistemic Imagery

There is a long philosophical tradition that views images as mere embellishments or meagre substitutes for text for the benefit of the illiterate—as subsidiary tools, or as outright misleading. Most famously, Plato rejected images, at least in the sense that they intend to offer a mimetic copy of the sensory, shadowy reality that surrounds us.<sup>1</sup> Generally, Western philosophy, including the sort of natural philosophy we now identify with science, tended to assign conceptual clarity, abstraction, or universality to words, and associated images with ambiguity, concreteness, or specificity. However, as Martin Kemp has rightly stressed, the Renaissance witnessed 'the rise of illustration as a major tool of science', with our own modes of representation being 'very much the heirs' of this 'revolution'.<sup>2</sup> Giordano Bruno, perhaps the most extreme example of a Renaissance visual thinker, went so far as to maintain that 'non est philosophus, nisi qui fingit et pingit' ('he who does not imagine in words and pictures is no philosopher').<sup>3</sup> His reliance on his own imagination

<sup>1</sup> The main locus of Plato's argument is Book x of the *Republic*.

<sup>2</sup> Kemp M., "Seeing and Picturing: Visual Representation in Twentieth-Century Science", in Krige J. – Pestre D. (eds.), *Science in the Twentieth Century* (Amsterdam: 1997) 36–390, 363.

<sup>3</sup> Giordano Bruno, *Explicatio triginta sigillorum ad omnium scientiarum et artium inventionem, dispositionem et memoriam* [...] (s.l., s.d. [London: 1583]), fol. a8r (= Fiorentino F. – Tocco F. –

explains why, despite his evident lack of craftsmanship, Bruno chose to illustrate his works with his own woodcuts.<sup>4</sup> A different, but equally prominent case is that of René Descartes who, while distrusting the power of the human senses, relied heavily on illustrations with which he led his readers into otherwise invisible microscopic realms.<sup>5</sup> Importantly, however, neither Bruno nor Descartes relied on Platonic mimesis. Their images did not imitate what we ordinarily see, but instead attempted to replace the ordinary visual world with an alternative and, in their view, more genuine world, Bruno's being archetypically or symbolical, Descartes' corpuscular or mathematical. Indeed, the types of epistemic imagery that have sprung up since the Renaissance engage in complex but ill-understood and under-examined strategies of visual persuasion, strategies which bypass our daily perceptions while trying to show us realities—structures, patterns, connections, underlying realities—that our senses fail to perceive, and that our words can at best capture with difficulty.<sup>6</sup>

The early modern proliferation of epistemic picture making has received increased attention in the past couple of decades. There is, indeed, much to be discussed here: a whole domain of images which, due to their lack of aesthetic qualities, do not often attract the attention of art historians, is to be uncovered, catalogued, and examined.<sup>7</sup> Attention has been paid to the way in which

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et al. (eds.), *Jordani Bruni Nolani Opera latine conscripta* (Naples and Florence: 1879–1891; repr. Stuttgart: 1962), vol. 11/2, 133).

- 4 For Bruno's woodcuts, see Gabriele M., *Giordano Bruno: Le incisioni nelle opere a stampa* (Milan: 2001).
- 5 See on this Zittel C., *Theatrum philosophicum: Descartes und die Rolle der ästhetischen Form in der Wissenschaft* (Berlin: 2009); also Lüthy C., "Where Logical Necessity Becomes Visual Persuasion: Descartes' Clear and Distinct Illustrations", in Maclean I. – Kusakawa S. (eds.), *Transmitting Knowledge: Words, Images and Instruments in Early Modern Europe* (Oxford: 2006) 97–133. On the role of imagination in Descartes' philosophy, see Dennis Sepper's essay in this volume.
- 6 I will use the term 'epistemic image' instead of the more common alternative, 'scientific image', for two reasons: first, today's connotations of 'scientific' do not match the endeavours of an earlier age; second, the adjective 'epistemic' refers to the general function of helping to 'understand' a given theory or truth, irrespective of its 'scientific' status.
- 7 On the category of 'epistemic imagery' in the early-modern period, see (inter alia) Daston L., "Epistemic Images", in Payne A. (ed.), *Vision and Its Instruments: Art, Science, and Technology in Early Modern Europe* (University Park, PA: 2015) 13–35; Topper D., "Towards an Epistemology of Scientific Illustration", in Baigrie B.S. (ed.), *Picturing Knowledge. Historical and Philosophical Problems Concerning the Use of Art in Science* (Toronto: 1996) 215–49; Elkins, J., *The Domain of Images* (Ithaca, NY: 1999); Murdoch J. *Album of Science*, vol. 1. *Antiquity and Middle Ages* (New York: 1984); Dackerman S. (ed.), *Prints and the Pursuit of Knowledge in Early Modern Europe* (Cambridge, MA: 2011); Kusakawa S., *Picturing the Book of Nature. Image, Text, and Argument*



different types of visual tools were employed to classify natural objects.<sup>8</sup> But the way in which the visual tools themselves have to be classified remains elusive. What also continues to defy our full understanding is the way in which epistemic images were expected to function in the first place. Certainly, images were intended to buttress, clarify, or otherwise illustrate the theoretical texts into which they were inserted, and sometimes they were even expected to carry the burden of proof. But why, one may ask, should images possess such wonderful capacities? Or, to rephrase this question in intentional terms, why did the authors or craftsmen of epistemic images expect them to possess these capacities? Curiously, they do not usually tell us; they simply refer to the images—*haec figura docet*—as if seeing them were sufficient, in a self-explanatory way. But by merit of which features were images expected to be more powerful, or more accurate, or more memorable, or more explanatory, than words? From which features were they supposed to draw their powers? And to which mental faculty were they expected to appeal? Which part of our cognitive apparatus was meant to grasp the logic of images?

The silence on the part of authors of image-carrying texts is all the more perplexing as different sorts of images presumably require different epistemological and ontological justification. Emblems in alchemical treatises, diagrams in mathematical manuals, Porphyrian trees in logic textbooks, Ramist *sciagraphiae* in didactic manuals, numerological symbols in millenarian pamphlets, dissected members depicted in anatomical studies, volvelles in astronomy books, and images of plants or animals in herbals or bestiaries: surely each of these distinct types of images was to be viewed, understood, and interpreted differently. Each must have 'taught' in its own distinctive way, and must have borne a specific relation to the structure of the world as experienced by our senses. Surely, the image of a dissected arm could (and can) not possibly be expected to bear the same relation to the empirical world as an emblem, a diagram, or a genealogical tree.

Rendering things even more complex, authors-*cum*-illustrators often relied, in one and the same publication, on a variety of types, sometimes even combining them. In fact, throughout the early modern period, one finds a number of crossovers between what we might catalogue as 'emblems' and what we

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in *Sixteenth-Century Human Anatomy and Medical Botany* (Chicago: 2011); Siegel S., *Tabula. Figuren der Ordnung um 1600* (Berlin: 2009); Krämer S. and Bredekamp H., *Bild Schrift Zahl* (Munich 2003).

8 See, for example, Swan C., "From Blowfish to Flower Still Life Paintings. Classification and Its Images, circa 1600", in Smith P.H. – Findlen P. (eds.), *Merchants & Marvels. Commerce, Science, and Art in Early Modern Europe* (New York: 2002) 109–136.

might term 'diagrams', and between what to *us* would seem to be 'structural models' and what *we* would understand as 'realistic representations'. What is puzzling or outright frustrating to the modern beholder is the seemingly natural silence that surrounds these images. This begins with the historical actors' tendency to refer to their visual creations, however unique or unusual they may be, by the catch-all term *figura*. Admittedly, the indiscriminate use of this term is identical to our own habit of referring to just about any visual insert in a publication as a 'figure', irrespective of whether it is a photograph, a statistical diagram, a drawing, or a map.<sup>9</sup>

A rare exception to this almost total absence of reflection on epistemic imagery is Giordano Bruno's treatise *De imaginum, signorum et idearum compositione* (*On the Composition of Images, Signs and Ideas*, 1591). Here, Bruno seems to offer an answer to the questions that have just been posed. First, he proposes a precise iconographic terminology, consisting of the following twelve Latin terms: *idea*, *vestigium*, *umbra*, *nota*, *character*, *signum*, *sigillum*, *indicium*, *figura*, *similitudo*, *proportio*, and *imago*. Additionally, he offers a tripartite Neoplatonic theory that specifies how these types of images and signs are related, in succession, to God's mind, His creation, and our mind and its faculty of *imaginatio*. In this sense, Bruno's work seems to respond to the desideratum formulated above, by offering a properly labelled and clearly defined set of visual conventions that make explicit the epistemic status of images. Alas, the usefulness of Bruno's theory is hampered by a number of factors. His terminology refers to mental images as well as to those drawn on paper, which opens up an entirely new realm of confusion. Moreover, his proposed terminology is highly idiosyncratic. Not only does it fail to adhere to the linguistic conventions of his time, but it deviates from his own terminology as well. In other books, Bruno confronts us with images called *archetypus*, *forum*, *atrium*, *rota*, or *area*, terms that are not contained in his treatise on image making. And even in *On the Composition of Images*, the very book that contains the above-mentioned list of twelve terms, Bruno soon forgets both his terminology and his tripartite

9 On these vexing issues see Lüthy C. – Smets A., "Words, Lines, Diagrams, Images: Towards a History of Scientific Imagery", *Early Science and Medicine* 14, 1–3 (2009) 398–439. On the issue of emblematics, see Ashworth, W.B., Jr., "Natural History and the Emblematic World View", in Lindberg D.C., & Westman R.S. (eds.), *Reappraisals of the Scientific Revolution* (Cambridge: 1990) 393–332; Praz M., *Studies in Seventeenth-century Imagery* (Rome: 1964); Beretta M. "The Role of Symbolism from Alchemy to Chemistry", in Mazzolini R.G. (ed.), *Non-verbal Communication in Science Prior to 1900* (Florence 1993) 279–319; Hackmann W.D., "Natural Philosophy Textbook Illustrations 1600–1800," (ibid.) 169–96.

visual theory when, in Part II, he seeks to craft emblems in the Ficinian tradition of 'efficient images'—that is to say, images that possess magic qualities.<sup>10</sup>

How to proceed if epistemic picture makers hardly ever articulate the intended nature of their images, and if those few who do turn out to be self-contradictory or inconsequential? How can we come to terms with the intended function, meaning, and status of images, and the ontological, epistemological, and pedagogical assumptions that underlay their making and use? There seems to be at least one way in which one can approach this vexed issue—namely, by examining controversies, specifically those controversies that involved imagery. As it turns out it is here, rather than anywhere else, that our questions are addressed, and that the otherwise tacit presuppositions of picture makers are brought to light.

This essay seeks to document by way of one illustrious example how a controversy forced participants to elucidate the status and function of the images they used; how, in the process, unexplained epistemic assumptions were rendered explicit; and how the increased attention to these assumptions influenced the terminology with which the images were described. The controversy in question involved the astronomer Johannes Kepler (1571–1630) and the Rosicrucian physician Robert Fludd (1574–1637).<sup>11</sup> In the following we will trace the polemics these two emblematic Renaissance figures engaged in as they quarrelled bitterly over the precise relation between harmonics and cosmology and the role that geometrical reasoning, imagery, and imagination played in defining them.

10 Giordano Bruno, *De imaginum, signorum et idearum compositione: Ad omnia inventionum, dispositionum et memoriae genera libri III* (Frankfurt, Wechel & Fischer: 1591).

11 This controversy has been analysed on a number of occasions, notably by Frances Yates in her *Giordano Bruno and the Hermetic Tradition* (London: 1964) ch. 22; and by Peter Ammann in a careful exegesis entitled "The Musical Theory and Philosophy of Robert Fludd", *Journal of the Warburg and Courtauld Institutes* 30 (1967) 198–227. More recently, Natacha Fabbri has examined the specifically musicological themes in "Kepler: Il cosmo armonico e la musica", *Nuncius* 16 (2001) 3–48, and *Cosmologia e armonia in Kepler e Mersenne. Contrapunto a due voci sul tema dell'Harmonice mundi* (Florence: 2003). The pivotal role that images play in that otherwise verbose controversy was first stressed by Robert Westman in his wonderful article "Nature, Art, and Psyche: Jung, Pauli, and the Kepler-Fludd Polemic", in Vickers B. (ed.), *Occult and Scientific Mentalities in the Renaissance* (Cambridge: 1984) 177–229. I am greatly indebted to these sources, which first drew my attention to the importance of vision, imagination, and imagery in the works involved in this controversy.

## The Beginning of the Controversy

In 1617, Johannes Kepler, who was based in Linz at that time, returned to his hometown in Württemberg to assist his mother, who was accused of witchcraft there.<sup>12</sup> On this occasion he also took the opportunity to visit the Frankfurt Book Fair, where he chanced upon a large folio tome: the first part of Robert Fludd's *Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia*, a multi-volume work the parts of which appeared between 1617 and 1621. Its author identified himself on the title page as 'esquire' (*armigerus*) and 'doctor of medicine from Oxford' (*in medicina doctor Oxoniensis*). To Kepler, as to any reader of the time, it must immediately have been evident that the Oxonian was under the forceful influence of the elusive brotherhood of the Rosicrucians, whose manifestos had around 1615 begun to agitate a northern European intellectual elite that desired a wholesale reform in the domains of religion, philosophy, and politics. In fact, Fludd's multi-volume *Utriusque cosmi historia* was published by the De Bry press, which had established itself as the leading publisher of Rosicrucian works.<sup>13</sup>

The third book of the first part of Fludd's *Utriusque cosmi historia*—the part that Kepler happened upon at Frankfurt—comprises a treatise entitled *De musica mundana*. This title, which translates as 'On cosmic music' (rather than 'On musac'), refers to the first element of the tripartite Boethian distinction between 'cosmic music' (*musica mundana*), 'human music' (*musica humana*) and 'instrumental music' (*musica instrumentalis*).<sup>14</sup> That Kepler took an immediate interest in this particular aspect of Fludd's work is not surprising, given that he had, since 1599 and with renewed energy during his stay in Württemberg, been working on his own *Harmonice mundi* ('Harmonics of the world'), which would appear in print soon after his visit to Frankfurt, in 1618–1619.<sup>15</sup> Since Kepler,

12 See Caspar M., "Nachbericht", in Kepler J., *Gesammelte Werke*, vol. 6, ed. Caspar M. (Munich: 1940) 462–484, 479. On Kepler's defence strategy, see Rublack U., *The Astronomer & the Witch. Johannes Kepler's Fight for His Mother* (Oxford: 2015).

13 On the flood of Rosicrucian publications see, above all: Gilly C. (ed.), *Cimelia Rhodostauritica: Die Rosenkreuzer im Spiegel der zwischen 1610 und 1660 entstandenen Handschriften und Drucke. Ausstellung der Bibliotheca Philosophica Hermetica Amsterdam und der Herzog August Bibliothek Wolfenbüttel* (Amsterdam: 1995).

14 On the long history of the *musica mundana* and the Pythagorean tradition of linking music and cosmology, see Godwin J., *The Harmony of the Spheres: A Sourcebook in the Pythagorean Tradition in Music* (Rochester, Vt.: 1992).

15 On the origins and development of Kepler's *Harmonice mundi*, see Caspar, "Nachbericht" 462–484. Stephenson B., *The Music of the Heavens: Kepler's Harmonic Astronomy* (Princeton: 1994).

like Fludd, believed that harmonic or musical intervals could be employed to explain aspects of the celestial order, Fludd's attempt to do so would not have left him indifferent. However, what Kepler read in Fludd's work did not please him. It was not just that Fludd subscribed to a Ptolemaic, geocentric universe, while Kepler was a heliocentrist; it was Fludd's entire worldview, including the use to which he put seemingly mathematical reasoning, that Kepler found objectionable. When, one year later, he published his own *Harmonice mundi*, Kepler included an appendix consisting of a three-page explanation of how his approach to celestial harmonies differed from Fludd's. This short *prise de position* triggered a verbose controversy, which lasted until 1623, when Kepler decided that all that needed to be said had been said. The drawn-out polemics that ensued on Kepler's 1617 encounter with Fludd's *Utriusque cosmi historia* are of interest here because images, their typology, and their respective powers of demonstration emerged as central fields of contestation.

### Fludd's *Utriusque cosmi historia*

So as to comprehend the logic of the Kepler-Fludd controversy, a brief introduction to Fludd's work, of which just the first part fills an astonishing 989 folio pages, leaving aside the various extensive indices, is in order. The various parts of this voluminous work contain dozens of marvellous etchings by Matthæus Merian the Elder (1593–1650). In his *Utriusque cosmi historia*, Fludd addresses a wealth of themes, combining biblical exegesis, cosmogony, physics, anthropology, alchemy, and descriptions of just about all the human arts and crafts with which he was acquainted. However eclectic Fludd's approach may seem, it combines a fairly small number of dominant elements—elements that had already been clearly set out in Fludd's *Tractatus apologeticus* of 1617, a defence of the Rosicrucian brotherhood.<sup>16</sup>

Both of these works bespeak a strong belief in Mosaic physics. Fludd operated under the assumption (to which the introductory exegesis of *Utriusque cosmi historia* is devoted) that the biblical book of *Genesis* provides us with a more reliable set of principles for natural philosophy than those offered in Aristotelian university textbooks. In addition, he subscribes in all of his works to the Hermetic belief in the existence of a *prisca philosophia*, a divinely revealed philosophy claimed to have been held by the earliest philosophers and sages—a belief that was easily combined with Mosaic physics. Fludd

16 Robert Fludd, *Tractatus apologeticus integritatem Societatis de Rosea Cruce defendens* (Leiden, Basson: 1617).

was furthermore convinced that both Paracelsus, with his analogy between macro- and microcosm and his alchemical interests, and the above-mentioned Rosicrucian movement, which in those years sent millenarian vibrations through Northern Europe, opened up new possibilities for bringing to the Mosaic and the Hermetic traditions new life and vigour. The reform that Fludd wished to bring about was to affect all sciences, arts, and crafts, even as it proceeded from an essentially theological perspective.<sup>17</sup> It may be surprising to the modern reader, but the initial dedication letter in the *Utriusque cosmi historia* is not addressed to a king or duke, but to God Himself: to ‘God, the best and the greatest, my incomprehensible Creator’ (*Deo optimo maximo creatori meo incomprehensibili*), signed by Fludd as ‘Your creature, the most unworthy of all’ (*Tua creatura omnium indignissima*). A temporal sovereign, King James I of England, figures as the second, and secondary, dedicatee.<sup>18</sup>

The first part of the multi-volume *Utriusque cosmi historia*—the 1617 part to which Kepler reacted—is, like all later volumes, lavishly illustrated, and several of its rich and striking images are still famous. The visual nature of Fludd’s philosophy is immediately and splendidly evident in the opulent programmatic title page of Part I [Fig. 9.1]. As the lengthy title indicates, the book’s main theme is the relation between macrocosm and microcosm, whereby Fludd understands ‘macrocosm’ as the entire universe and, notably, its cosmological set-up, whereas by ‘microcosm’, he means not only man himself, as the title illustration might suggest, but also his various crafty imitations of nature. Importantly for Fludd, images were not mere illustrations of things that might also be expressed in words, but were instruments necessary for understanding causal relations, cosmological processes, and divine intentions. Indeed, as Frances Yates correctly pointed out, Fludd’s images do not intend to provide ‘an exact visual counterpart to the elaborate descriptions in the text’.<sup>19</sup> Instead, they often precede words that struggle to express what is given visually. Images were not mere explanatory tools for Fludd. They were, above all, tools

17 On Mosaic physics, see e.g. Blair A., “Mosaic Physics and the Search for a Pious Natural Philosophy in the Renaissance”, *Isis* 91,1 (2000) 32–58. Howard Hotson has recently mapped out the various early modern currents that called for a ‘universal reform’ in his excellent “Outsiders, Dissenters, and Competing Visions of Reform”, in Rublack U. (ed.), *The Oxford Handbook of Protestant Reformations*, online publication July 2016 ([www.oxfordhandbooks.com](http://www.oxfordhandbooks.com)), DOI: 10.1093/oxfordhb/9780199646920.013.33.

18 Robert Fludd, *Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam divisa*, vol. 1 (Oppenheim, De Bry: 1617) 1 (dedication to God) and 2 (dedication to King James).

19 Yates F.A., *Theatre of the World* (London: 1969) 74.

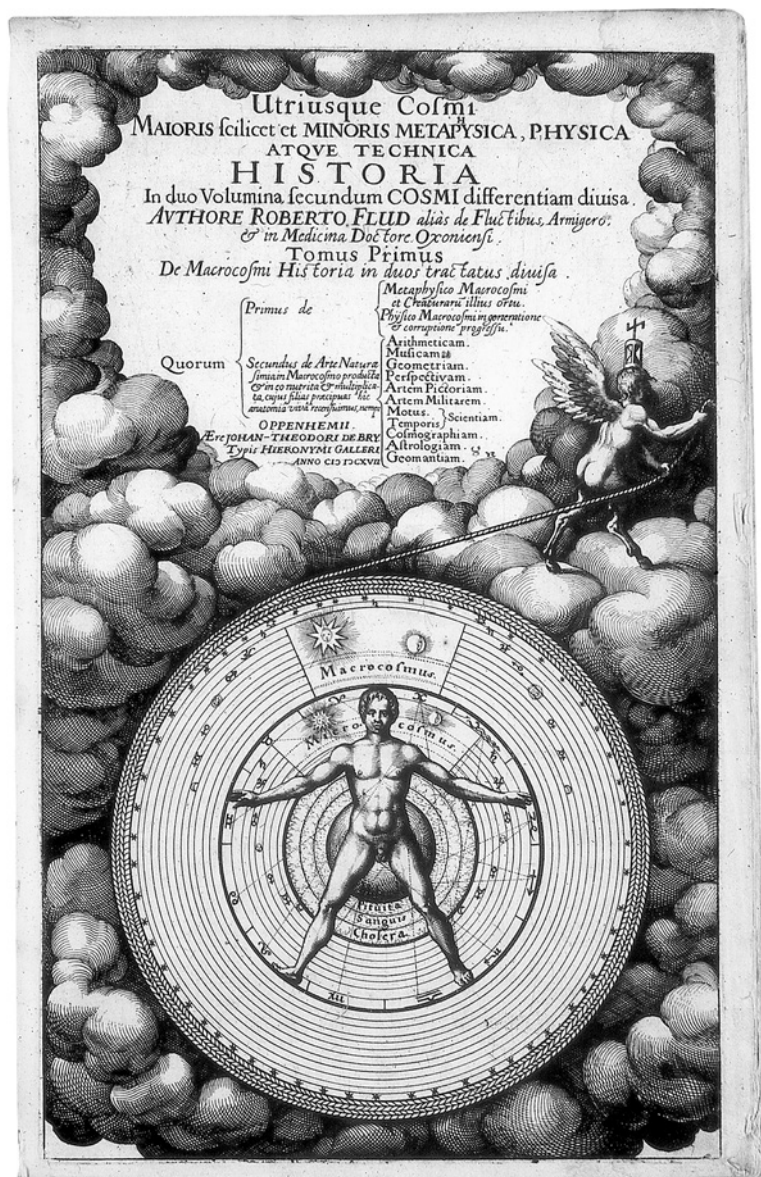


FIGURE 9.1 Copper engraving by Matthæus Merian for Robert Fludd, *Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam diuisa*, vol. 1 (Oppenheim, De Bry: 1617) title page.

of exploration and mental elevation. In fact, the central function that images possessed for Fludd is evident from the 'Short Declaration' (*Declaratio brevis*), an apologetic tract that, in defence of his Rosicrucian convictions, he submitted in the following year, 1618, to King James. There, he explains that 'the true philosophy' proposed by that brotherhood 'will diligently investigate heaven and earth, and will sufficiently explore, examine and depict Man, who is unique, by means of images' (*imaginibus depinget*).<sup>20</sup>

Returning again to the *Utriusque cosmi historia*, we may now add that while elaborate thematic title pages were common in the early seventeenth century, what is unusual about Fludd's is that it is followed by a large and complex folding plate [Fig. 9.2], that serves to introduce the treatise.<sup>21</sup> Its caption reads, '*Integræ naturæ speculum Artisquæ imago*' ('A mirror of all of nature and an image of art'). Here, we encounter the first two terms from Fludd's rich iconographical glossary: *speculum* and *imago*. A third—*emblema*—is introduced in the immediately subsequent pages, where Fludd turns to the task of explaining his fold-out image in a two-page 'explanation of the emblem' (*Emblematiss [...]* *explicatio*).<sup>22</sup> This 'emblem', 'image', or 'mirror' is, as the reader quickly learns, akin to a condensed table of contents, which one studies from the outside inwards. Part I of Fludd's voluminous work deals with the chain connecting God's hand to the personification of nature, and from lady nature to the ape—that mirror of man who, in all his arts, literally apes nature. In other words, Part I of Fludd's work deals with God's creation and man, his most eminent creature, while Part II, which did not appear until 1618, was to address the innermost circles of the *speculum* [see, again, Fig. 9.2], which contain small images referring to the various human arts, including the quadrivium (arithmetic, geometry, astronomy, and music theory) as well as fortification, painting, and the mechanical arts.<sup>23</sup>

As Fludd explains in his introductory Proem, it is his intention to reconstruct the master plan underlying God's creation, and to define the causes at work within it. Given that there was no human witness to report the causes

20 Robert Fludd, *Declaratio brevis*, trans. R.A. Seelinger, Jr., in Huffman W.H. – Seelinger, R.A., Jr., "Robert Fludd's 'Declaratio Brevis' to James I", *Ambix* 25 (1978) 60–92, 82; cited in Westman, "Nature, Art, and Psyche" 179.

21 On early modern programmatic title pages, see Remmert V., *Picturing the Scientific Revolution: Title Engravings in Early Modern Scientific Publications* (Philadelphia: 2011).

22 Fludd, *Utriusque cosmi historia* 7.

23 Robert Fludd, *Tractatus secundus, de naturæ simia, seu technica macrocosmi historia in partes undecim divisa* (Oppenheim, De Bry: 1618), the frontispiece of which shows, once again, the ape, this time in the act of teaching, stick in hand, the eleven arts discussed in the volume.



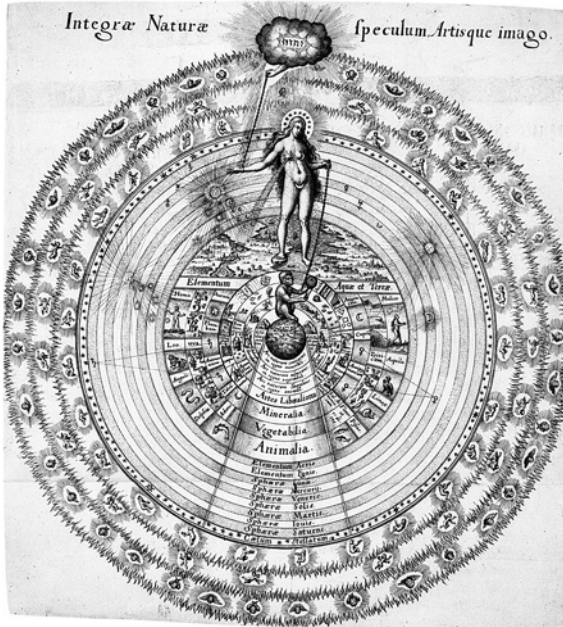


FIGURE 9.2 *Copper engraving by Matthæus Merian for Robert Fludd, Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam divisa, vol. 1 (Oppenheim, De Bry: 1617) folding plate inserted immediately after the dedicatory letters.*

unleashed in the original divine act, these have to be reconstructed *a posteriori*, on the basis of their effects. According to today's methodological standards, such an *a posteriori* reconstruction would qualify as inference, but in Fludd's terminology, both the divine plan and the causes that brought about the creation of the universe can be 'demonstrated'.<sup>24</sup> As we will see shortly, Kepler was to take exception to this understanding of *demonstratio*. Fludd, however, was convinced that his successful demonstration was guaranteed by two sources: direct divine inspiration of the type granted to Moses, and a procedure that

24 Fludd, *Utriusque cosmi historia*, 13: ‘Prooemium, in quo demonstratur, quomodo causæ per suos effectus, hoc est, demonstratione, a posteriori indagentur’: ‘idcirco necesse est a posteriori eum indagari, ut nostra cognitio ad ipsum per eximiores ejus effectus accedat’. All translations in this essay are mine, unless otherwise indicated, even for passages for which earlier translations are available.

involves moving from what we know best to what is further from our immediate knowledge.<sup>25</sup> What do we know best? According, unequivocally, to Fludd, it is 'matter' and 'form'. By these he does not, however, intend the two principles of scholastic hylemorphism, but instead metaphysical opposites that move in different cosmic directions: Fludd equates 'matter' with water, which according to the biblical accounts rose up from below, and 'form' with light, which descended from above. Via this fundamental binary setup, Fludd soon arrives at the two archetypal forms that will subsequently characterise most of his reasoning and his 'demonstrations': the pyramids emanating from above and below, and the circles from which they emanate.<sup>26</sup>

Consistent with the tone of the Proem, the initial part of Fludd's treatise presents us with a characteristic admixture of aims: it is at once an interpretation of the book of Genesis, a cosmogony, and a cosmology. With a keen eye for iconography, Fludd reviews the reasons why God is sometimes depicted in the shape of a human being, and was in antiquity revered in the form of the sun. He then proceeds to a 'demonstration' of why He is best depicted as a triangle, the symbol of the Trinity; in addition, circles and equilateral triangles can be inscribed in one another infinitely.<sup>27</sup> Later in the treatise Fludd plays with increasing intensity with his two archetypal forms: the circle (the shape of Earth, Sun, Moon, and the celestial spheres), and the triangle (representing the Trinity, as well as different kinds of emanations, such as dark, material ones from below, and light, immaterial, or formal ones from above). As Fludd explains in detail in Part II of his work, the resulting, highly visual theory of interpenetrating pyramids provides the key to his philosophy.<sup>28</sup> Indeed, most of Fludd's cosmological imagery relies on the interaction between cones or pyramids with circles or spheres.

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25 Ibid.

26 Ibid. 14: 'Cum igitur per effectus ad causarum cognitionem perveniendum sit, incipienda est nostra perquisitio a rebus nobis magis cognitis, quæ sunt in genere duæ, scilicet materia et forma. Materiam autem rerum omnium esse aquam reliquerunt nobis Moyses, et divus Petrus'. Fludd's assumption is striking that 'what is better known to us' is not just what we have sensory access to, but what Scripture reveals. There is, then, from the very beginning, an odd circularity in Fludd's attempt to reconstruct through reason and experiment what God has not revealed to us textually.

27 Ibid. 18 (why God is sometimes depicted in human form), 19 (why God has been depicted as the sun), 20 (why He is best depicted as a triangle).

28 Robert Fludd, *Utriusque cosmi historia*, part II.1: *De integra microcosmi harmonia* (Oppenheim, De Bry: 1619), "De speculativa pyramidum metaphysicæ et physicæ scientia" 179–191. See Ammann, "Musical Theory" 200–201.

The modern reader/beholder might wonder what logic Fludd followed when he drew up his kaleidoscopic images of intersecting geometrical figures. Of the various underlying principles, a divinely grounded 'symmetry' constitutes the most central element of Fludd's system. Fludd defines 'symmetry' thus:

By 'symmetry', let us understand that most admirable proportional measure which we ought to love and contemplate not only in man himself, but also in all other natural things. For it clearly appears to be nothing but a certain harmonic instrument that is most absolute in all number in such a way that everything is composed out of parts that are everywhere arranged according to a most exact dimension, and among all other things above all, that noble human body.<sup>29</sup>

As Westman has pointed out, this passage, which is found in a later part of the *Utriusque cosmi historia* entitled 'On the art of painting', connects three key ingredients of Fludd's worldview: a belief in the ubiquity of symmetrical relations; the conviction that these symmetries can be understood in terms of musical harmonies; and the idea that these symmetries are somehow numerical, and can therefore express themselves in an 'exact measure'.<sup>30</sup>

A grasp of this elementary toolkit—spheres, pyramidal emanations, and harmonic relations—suffices to convey what Fludd tries to achieve in *Utriusque cosmi historia*, and to decipher at least the basic structure of many of his images. His account opens with the generation of the world, and with a remarkable depiction of the abyssal dark that existed before Creation, a state entirely defined by privation [Fig. 9.3]. The key difference between this image and Kazimir Malevich's iconic *Black Square* of 1915 (Tretyakov Gallery, Moscow) lies in the fact that Fludd's image is only a square by accident; it intends to represent the primordial infinity of privation. Identical captions, placed in the margins of all four sides of the square, reiterate: 'And thus infinitely'.<sup>31</sup>

29 Fludd, *De naturæ simia*, section "De arte pictoria" 320: 'Per *Symmetriam* igitur intelligimus admirabilissimam illam mensuram proportionalem, quam non modo in ipso homine, sed etiam in omni re alia naturali et contemplari, et amare debemus, cum nihil plane aliud esse videatur, quam harmonicum quoddam instrumentum omnibus numeris absolutissimum, ita ut exactissima dimensione distributis unique partibus composita sint omnia, ac præsertim inter cætera nobile illud corpus humanum'.

30 Westman, "Nature, Art and Psyche" 183–184.

31 Fludd, *Utriusque cosmi historia* 26.

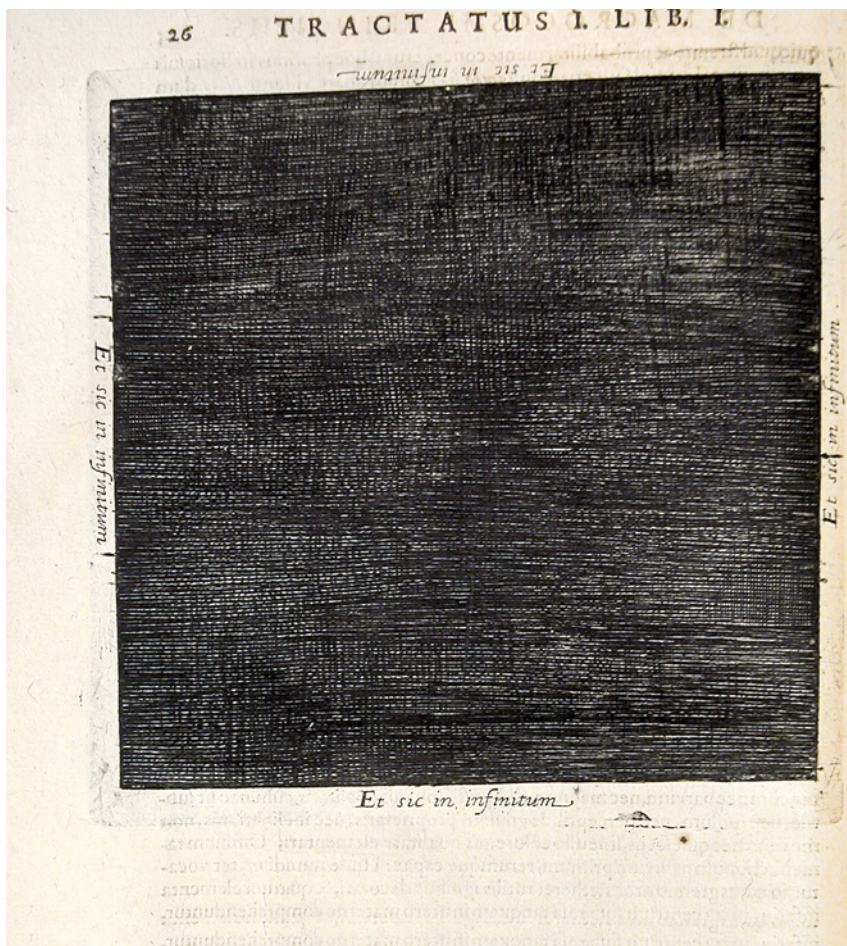


FIGURE 9.3 Copper engraving by Matthæus Merian for Robert Fludd, *Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam divisa, vol. 1* (Oppenheim, *De Bry*: 1617) 16.

In subsequent engravings in the *Utriusque cosmi historia*, this primeval field of black negation is segmented by white, triangular shafts, as cones of light usher in the act of creation. Fludd references chemical experiments to give weight to his exegetical approach, comparing, for example, the separation of light and darkness to the process of distillation.<sup>32</sup> Despite Fludd's obscurantist reputation among historians of science, the ways in which he uses experiments to reinforce his biblical metaphysics, and the ways in which he uses images of

32 Ibid. 29 and 31.

a varied typology to elucidate his theoretical claims, are quite sophisticated. Whether his patchwork of the Bible, Rosicrucianism, Hermeticism, alchemy, and metaphysics is anything other than questionable, and whether it looked convincing to his contemporaries, is, of course, an altogether different question. At any rate, throughout his treatise Fludd's use of images is imposing. Sometimes he inserts them at the end of a theoretical argument, and in those cases, he might introduce them as follows: 'We have expressed the description of this [...] matter in this fashion'.<sup>33</sup> At other times the images precede the argument, which therefore takes the shape of an 'explanation of the [...] image'.<sup>34</sup> Sometimes, pictures replace the written text altogether, as in the case of the Holy Spirit, where Fludd justifies his procedure in the following manner:

Given that are in this place beginning to tell our story about created things, we have for this reason here, with regard to the first region of the creation of the macrocosm, left away all uncreated things and the description of the Holy Spirit, simply depicting, so as to capture our imagination, the operations of its uncreated rays[.]<sup>35</sup>

Without using words, then, Fludd intends 'to capture our imagination' by 'simply depicting' that about which he remains silent!

Once a sufficiently dense and geometrically complex intermingling of light and darkness has been achieved in the account of the Creation, Fludd turns to the celestial order. It is here, in Book III, *De musica mundana*, that the musical harmonies that attracted Kepler's attention come into play. It is impossible—and also superfluous, given our current purposes—to survey Fludd's musical theory comprehensively here. The basic idea, illustrated in [Fig. 9.4], is that the cone of life-giving light descended from the triangular symbol of the Trinity above intersects the cone of dark materiality emanating from the Earth, the centre of the universe, and the centre of their intersection defines the place of the sun.<sup>36</sup> In order to understand Kepler's hostile reaction to this image, it is important to grasp the metaphysical, physical, and mathematical assumptions that underlie it in all their density. As previously suggested, the two pyramids represent

33 Ibid. 43: 'Nostræ igitur materiæ confusæ descriptionem [...] hoc modo expressimus'.

34 Ibid. 54: 'Explicatio figuræ sequentis'.

35 Ibid. 54: 'Quoniam hoc loco historiam nostram de rebus creatis incipimus, idcirco in primæ Macrocosmi regionis creatione res increatas, Spiritusque sancti descriptionem hic omisimus, depingentes solummodo pro imaginationis nostræ captu, operationem radiorum ipsius increatorum [...]':

36 Ibid. 79–81.

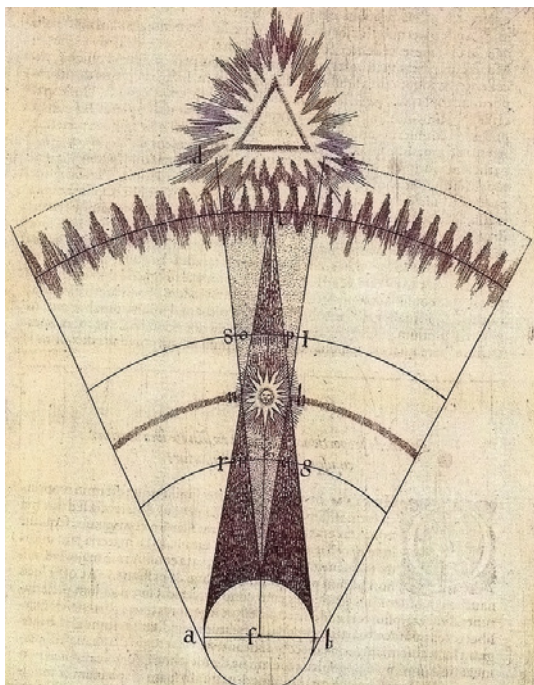


FIGURE 9.4

*Copper engraving by Matthæus Merian for Robert Fludd, Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam divisa, vol. 1 (Oppenheim, De Bry: 1617) 81.*

light and darkness as well as the metaphysical principles of form and matter; and they define cosmological space and determine the place of the most noteworthy celestial body, the sun. Progressively, Fludd derives an ever-increasing number of mathematical and spatial properties from this very primitive pattern of the two intersecting cones.

In [Fig. 9.5] we find a more evolved and complex rendition of the pattern just described.<sup>37</sup> This figure once again shows how divinity shines down in a 'formal pyramid' and how the Earth responds with a 'material pyramid'; the sun's place is again defined by the centre of the pyramids' intersection, in the so-called 'sphere of equality' (*sphæra æqualitatis*), where form and matter are in equilibrium and where the world soul is also located.<sup>38</sup> What is new about [Fig. 9.5] in comparison with [Fig. 9.4] is that the subdivisions of the two cones in the former purportedly allow Fludd to define the precise places of the four elements, of the planets, and of the angelic orders. How does Fludd arrive at

<sup>37</sup> Ibid. 89.

<sup>38</sup> Ibid. 82: 'invenimus sphæram æqualitatis totius mundi, et ipsius animæ mediæ locum, in quo lux increata tabernaculum suum posuit, animamque mundi collocavit'.



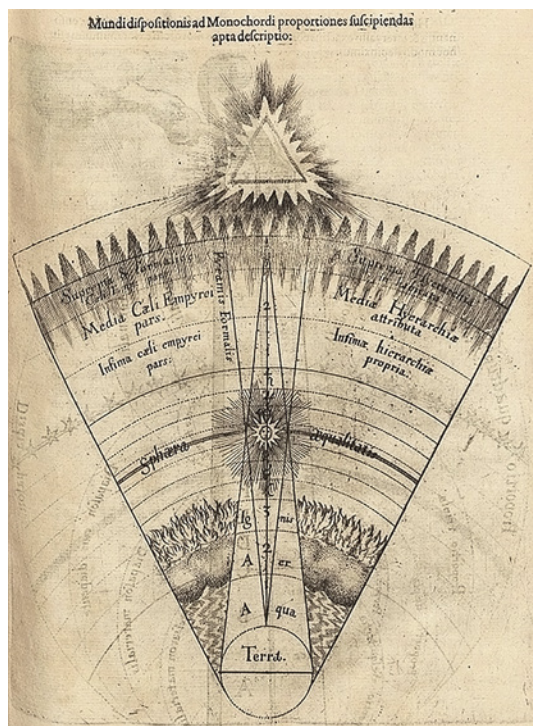


FIGURE 9.5

Copper engraving by Matthæus Merian for Robert Fludd, *Utriusque cosmi maioris scilicet et minoris metaphysica, physica atque technica historia in duo volumina secundum cosmicam differentiam divisa*, vol. 1 (Oppenheim, De Bry: 1617) 89.

the geometrical spacing of these heterogeneous orders of being? Here, his musical theory—a theory that is indebted to the time-honoured Pythagorean analogy between cosmological and musical ratios—comes into play. In Fludd's reasoning, the analogy is 'demonstrated' by the spatial relations that hold between cosmic entities on the one hand, and the subdivision on a one-stringed instrument, the monochord, on the other. On the page immediately following [Fig. 9.5] Fludd in fact superimposes the string of the monochord on the cosmos, thereby turning it into a simple yardstick for cosmic proportions [Fig. 9.6]. For Fludd, as he would write elsewhere, the monochord was 'the most exact symbol of the cosmic nature and the figure (*typus*) of its truth'.<sup>39</sup>

For his part, Kepler objected vehemently to this idiosyncratic application of musical ratios to cosmic space. He was unable to accept Fludd's notion that the places of the planets could be aprioristically defined by the ratios on a musical monochord, rather than through the actual measurements carried out

39 Robert Fludd., *Clavis philosophiæ et alchymicæ Fluddanæ* (Frankfurt, Fitzer: 1633) 30: 'exactissimum naturæ mundanæ symbolum et ipsius veritatis typus'.





by astronomers. As for the spatial ratios of the elements or the angelic orders, Kepler's charge was that they were simply postulated, not measured—which, in the case of angels, might have been a difficult task anyway. For Fludd, however, the beauty of musical proportions lay precisely in their power to indicate the true format of the universe: 'These general proportions produce the general as well as the particular consonances of the cosmic monochord', he writes, promising to 'demonstrate' this by means of words and images. 'And the demonstration of their macrocosmic proportions is carried out thus [...]', he writes with reference to [Fig. 9.6].<sup>40</sup>

It is the function of [Fig. 9.6], then, to perform the transition from the metaphysical triangles to the musical monochord. While the triangles had provided the general formatting of the universe, defining the respective places of God, the Sun, and the Earth, the monochord allows for the fine-tuning of the infra- and suprasolar domains.<sup>41</sup> As the beholder will notice, the monochord is divided into two halves, following the logic of two octaves with the numerical ratio of 1:2. The *sphaera æqualitatis* in the middle now separates an upper, spiritual, and everlasting octave (with more form than matter, and more light than darkness), from a lower octave, which covers the material and transitory realm. Drawing the reader's attention to this image, Fludd writes:

Here, we have composed the cosmic monochord with its proportions, consonants and intervals even more exactly, and we have depicted in this way how its motor [that is, the divine musician that makes the string vibrate] is to be found outside of the cosmos.<sup>42</sup>

40 Fludd, *Utriusque cosmi historia* 86 [erroneously numbered 83]: 'Ex quibus quidem proportionibus generalibus, consonantiæ tum generales quam particulares ipsius monochordi mundani producuntur, ut in capite sequenti delineabimus. Harum autem Macrocosmicarum proportionum demonstratio sic fit'.

41 Ibid. 90.

42 Ibid. 'His autem monochordum mundanum cum suis proportionibus, consonantiis et intervallis exactius composuimus, cujus motorem extra mundum esse hoc modo depinximus'. In *Utriusque cosmi historia*, part II.1: *De integra microcosmi harmonia* 22, Fludd describes God as the 'monad of monads, unity of unities', playing on the cosmic monochord: 'illa mystica monadum monas, unitas unitatum [...] Deus deorum [...] tonum illum sacrosanctum mysticum ineffabilem, et originalem intonans mundo, cujus pulsatione, actu et afflatus unisono ac uniformi mundus et creaturæ ejusdam variis formarum concordantiis, quibus existant et vivant, imbuuntur [...] Hæc, inquam, unitas est pulsator Monochordii et ipsa forma ac anima totius harmoniæ macrocosmicæ et microcosmicæ'. Cited in Ammann, "Musical Theory" 207n45.

Far from being an embellishment, the musical ratios are the key to Fludd's worldview. Both his theories of correspondence between celestial and human entities and his theory of specific celestial influences centrally depend on them. In the same way that in musical instruments, the ratios define the harmonies and resonances, so the cosmological ratios define for Fludd which things in the universe 'resonate' with one another, and which 'consonances' and 'dissonances' define and explain the miscellaneous relations of celestial and terrestrial things. The musical analogy is not limited to macrocosmic relations, either: man, too, that quintessential microcosm, may be understood as a monochord.

That Fludd was inordinately proud of his musical explanation of cosmic and human relations is evident; what is interesting for our current purposes is that this pride is regularly linked to image making:

This, then, is the natural harmony of the universal machine, which up to now no-one, as far as I know, has explained so succinctly and clearly. But the cosmic consonances of this monochord can be depicted (*depinguntur*) in the following manner [...].<sup>43</sup>

While for most previous theorists of cosmic harmonics music had merely provided an analogy, albeit a powerful one, it provided a veritable explanation for Fludd. But whereas his faith in the musical *explanans* is clear, the status of the corresponding imagery is less evident. One main issue is his iconographical terminology. On the one hand, he uses verbs such as 'composing' or 'depicting', as in the passage just quoted, which seem to imply a creative choice on the part of the image maker. On the other hand, he also insists on the certain, or even necessary, nature of his images. He repeatedly speaks of his lavish and costly images of musico-cosmic ratios in the same terms in which a mathematician would speak of a geometrical proof—that is to say, as a geometrical construction possessing demonstrative power—as when he uses phrases such as, 'the demonstration of this matter is as follows' (*demonstratio autem hujus rei est talis*). In those instances, he engages in language that apes mathematics, speaking of 'constructing' his images and referring to line A, point B, or angle  $\gamma$  in the fashion of the geometer. What to us must seem incompatible ways of looking at images—creative depictions and analogical reasoning versus exact

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43 Fludd, *Utriusque cosmi historia* 88: 'Hæc itaque est machinæ universalis harmonia naturalis, quam nemo hactenus, quod sciam, ita succinte atque dilucide explicavit. Istiusmodi autem monochordi mundanæ consonantiæ hoc modo depinguntur'.

geometrical demonstrations—appear to Fludd to follow one and the same logic. Westman aptly observes of this terminological issue:

In different places, Fludd refers to the act of bringing the pyramids together as a *demonstratio*, sometimes a *descriptio*, at other times a *mysterium* or a *delineatio*. All these terms, I suggest, have essentially the same sense: Picturing words produces in us a mysterious, expanded awareness that we did not previously possess.<sup>44</sup>

Indeed, Fludd thought of ‘demonstration’ as just one of a number of visual procedures that serve an anagogical goal by expanding our understanding. To a mathematically minded person such as Kepler, however, demonstration signified something quite different from raising consciousness or the production of ‘a mysterious, expanded awareness’. In a Euclidean framework, the sentence ‘*quod erat demonstrandum*’ concludes a procedure that combines geometrical execution and textual proof, which together, as Reviel Netz has documented, constitute the act of diagramming (‘*diagrammein*’).<sup>45</sup> In other words, in Greek mathematical demonstration, the text and the execution of the drawing run parallel, and together yield demonstrative proof of the truth of a proposition. Only when the entire figure has been constructed with compass and ruler according to the procedure described in the accompanying verbal instructions is one entitled to annotate it with the proverbial abbreviation ‘Q.E.D.’ When Fludd chose to call his allegedly geometrical images ‘demonstrations’, he appeared to claim a sort of epistemic certainty that his other terms—‘delineation’, ‘description’, and ‘mystery’ above all—clearly did not imply. Indeed, while the latter three terms were iconographically flexible, the former, ‘demonstration’, implied a rigorous procedure, at least to a mathematician, a procedure that, according to Kepler, Fludd ignored in his *demonstrationes*.

### Kepler’s *Harmonice mundi*

Kepler’s *Harmonice mundi*, on which he had been working on and off for two decades, shared a number of central premises with Fludd’s treatise. The most important was the conviction, attributed to Plato, that ‘God always geometrises’

44 Westman, “Art, Nature, and Psyche” 194.

45 Netz R., *The Shaping of Deduction in Greek Mathematics: A Study in Cognitive History* (Cambridge: 1999).

(ἀεὶ ὁ θεὸς γεωμετρεῖ).<sup>46</sup> For Kepler, the solar system, the place and the movements of the planets, and their astrological influences on man, were determined by geometrical patterns derived from the mind of the mathematically minded divinity. Fludd would have agreed with much of this, except that he subscribed to a geocentric model, and moreover did not apply his harmonics to the motions of the planets, but to their spatial ordering. Further, both the geometrical demiurge of Plato's *Timaeus* and Proclus's notion of mathematical imagination were central points of reference for Kepler and Fludd alike, as was the Pythagorean idea that musical ratios could provide the means by which to determine celestial ratios. Fludd went, however, much further than Kepler: as we have already seen, the musical monochord determines not only the place of the celestial bodies independently of any actual astronomical measurements, but also that of the elementary and angelic orders, as well as the nature of the microcosmic human being.

Interestingly, the two authors also converged in the person of their dedicatee, which in both cases was King James I of England, whom both Fludd and Kepler considered the ruler most likely to effect peace in the context of the interconfessional strife lacerating Europe at the time, and the ruler most likely to bring about a renewal in doctrine and science.

As regards the contents of *Utriusque cosmi historia* and *Harmonice mundi*, the parallels are most striking when Kepler and Fludd introduce musical theory in the respective third books of their treatises. In both works, musical harmonies are introduced once the foundations of their respective worldviews have been cast. These worldviews differed substantially, however, despite the mentioned common assumptions. In order to understand Kepler's displeasure at Fludd's reasoning, one must therefore understand the different ways in which they arrived at their respective Books III, and at the celestial harmonies treated in them.

[Fig. 9.7], which shows Kepler's title page, provides a clear impression of how his *Harmonice mundi* is organised. Kepler starts with basic geometry in Book I, and turns, in Book II, to the three-dimensional architecture of space. Book III, in which the theory of musical harmonies is superadded to spatial geometry, constitutes the centrepiece of his work, since the actual formatting of the physical cosmos hinges on it. Linking Book II to III is Kepler's insistence—already announced on the title page—that musical harmonies arise from geometrical figures and not from numbers, as the 'ancients' (the

46 Plutarch, *Quaestiones convivales* 8.2.

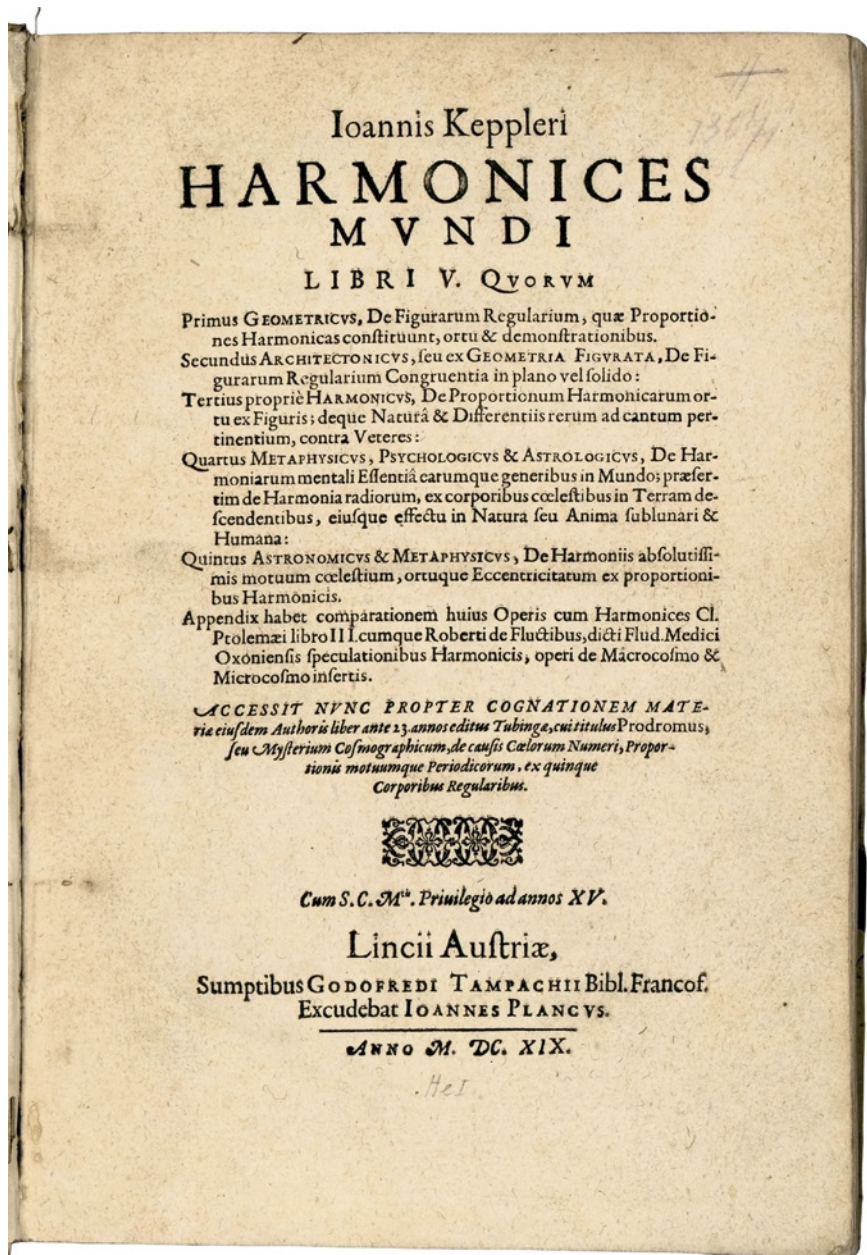


FIGURE 9.7 Johannes Kepler, *Harmonices mundi libri quinque* (Linz, Gottfried Tambach and Johann Planck: 1619) title page.

Pythagoreans and Plato) had maintained.<sup>47</sup> Since 1599, Kepler had adhered to the conviction that ‘what in geometry is construction, is consonance in music’.<sup>48</sup> For him, geometrical construction and musical ratios are, thus, intimately connected. Book IV studies the metaphysical, psychological, and astrological influences of celestial harmonics. Book V turns to astronomy: this celebrated book presents what would later be called his third law of planetary motion. Finally, in the Appendix, as the title page indicates, Kepler addresses as his second topic Robert Fludd’s speculations on musical and spatial relations.

Against the backdrop of this general overview of the *Harmonice mundi*, let us now address the visual means Kepler employs, and his terminology. In this respect, it is important to note the emphasis in Kepler’s text on the fifth-century Neoplatonist philosopher Proclus. Proclus is quoted on the title page already [Fig. 9.7], and we encounter him soon afterwards again in the Proem, the introduction to the *Harmonice mundi*, where Kepler presents the notion that geometrical things (*res geometricæ*) have an intellectual essence. How should this claim be understood? The answer is that geometrical truths are present in the divine mind even before they are expressed in creation.<sup>49</sup>

Notably, in the very first pages of his work, Kepler exposes us to an elaborate theory of *figuratio* and *intellectio*. The basic claim is that many geometrical figures can be ‘figured’, in the sense of being drawn or imagined, but few of them can be ‘understood’. For Kepler’s analysis of cosmological constellations, the following deep—but unproven—belief is central: among all possible figurations, God prefers those that can be understood. ‘To understand’ means, for Kepler, to be able to construct these figures geometrically with compass and ruler.<sup>50</sup> The theologically unwarranted presupposition is that God is subject to the same limitation as humans: what we cannot construct with compass and

47 Cf. Aristotle, *Metaphysics*, I, 5 on Pythagorean numerology.

48 Letter from Kepler to Herwart von Hohenburg of 14 September 1599, cited in Caspar, “Nachbericht” 468.

49 Johannes Kepler, *Harmonices mundi libri quinque* (Linz, Gottfried Tambach and Johann Planck: 1619), reprinted in Kepler, *Gesammelte Werke*, 6, ed. Caspar, “Prooemium” 15: ‘Prius autem figuræ sunt in Archetypo, quam in Opere, prius in mente divina, quam in creaturis; diverso quidem subjecti modo, sed eadem tamen essentiae suæ forma. Igitur quantitativus figuratio, Mentalis quædam essentia fit, seu intellectio, earum essentialis differentia’.

50 The beginning of the argument is found in Kepler, *Harmonice mundi*, lib. I, def. vii, in *Gesammelte Werke*, 6, ed. Caspar 21: ‘Scire in geometricis, est mensurare per notam mensuram; quæ mensura nota in hoc negotio inscriptionis Figurarum in circulum, est diameter circuli’; the complete argument is developed in book I. Caspar, “Nachbericht” 466–467 cites letters going as far back as 1599 in which Kepler repeatedly insists that geometrical proofs are understood by God and by us with the same certainty.

ruler, He cannot either. As seen above, Kepler rejects Pythagorean harmonics derived from numerological ratios already on the title page. The ratios Kepler is interested in are geometrical, an interest that takes him back to the possibilities and limits of God's circle and compass. In trying to determine which figures God could execute, Kepler makes use of a distinction between 'rational' and 'irrational' figures introduced in Book x of Euclid's *Elements*, but gives this distinction a new twist: the distinction between the 'rational' and the 'irrational' turns into that between the 'knowable' (*scibilis*) on the one hand, and the 'unknowable' (*inscibilis*) and 'unsayable' (*ineffabilis*) on the other. The crucial point in Kepler's reformulation of this distinction is that he wishes to convince his reader of his theory that God only realises proportions that are knowable. The regular heptagon, for example, 'had never been constructed by anyone, knowingly and willingly and on purpose', for it can only be constructed 'accidentally'; that is why God did not use it in his harmonic schemes either.<sup>51</sup>

Book I of the *Harmonice mundi*, then, examines those regular plane *figuræ* that are knowable, i.e., those that can be both proven and constructed by compass and ruler. Kepler's criterion for separating the knowable and constructable from that which is not is the division of the circle.<sup>52</sup> As mentioned above, in Book II Kepler turns to three-dimensional forms. Here, the crucial term is 'congruence', which is Kepler's adaptation of the Greek term 'harmony'.<sup>53</sup> Once again, Kepler needs to invoke God's mind to explain the translation of geometrical possibilities into cosmological realities: God had an *imago* of congruence in his mind even before He translated that image into spatial constellations within the universe. The basic idea is that geometry furnishes God with models for the construction of the universe. As Kepler explains under the marginal title of 'the metaphysical cause of the harmonies':

51 Kepler, *Harmonice mundi*, lib. I, prop. xlv, in *Gesammelte Werke*, 6, ed. Caspar 50: 'Itaque nullum unquam Regulare Septangulum a quoquam constructum est, sciente et volente, et ex proposito agente: nec construi potest ex proposito: sed bene fortuito construi posset'. See Caspar, "Nachbericht" 484–487, and Rebohm S., "Harmonikale Kosmologie: Johannes Kepler und Athanasius Kircher", in Dick W.R. – Duerbeck H.W. – Hamel J. (eds.), *Beiträge zur Astronomiegeschichte* 11 (Leipzig: 2011) 100–163, 107–108, on Kepler's attempt to use a *propria demonstratio* method to find magnitudes, including musical consonant intervals, on the basis of the division of a circle.

52 Kepler, *Harmonice mundi*, lib. I, def. ix, in *Gesammelte Werke*, 6, ed. Caspar 22: 'Demonstratio est quantitatis vel describendæ vel sciendæ, ex Diametro deductio, per intermedia possibilia'.

53 Ibid., "Prooemium" to lib. II, in *Gesammelte Werke*, 6, ed. Caspar 67.

Geometry, of which our first two books have gathered the part that is relevant here, is coeternal to God and shines forth in the divine mind, and has provided God with models (*exempla*) [...] for the decoration of the universe, so that the latter could become the best and most beautiful and hence most similar to the Creator. For all the various spirits, souls, and minds are the images (*imagines*) of God the Creator, which singly oversee their various bodies in order to govern, move, increase, conserve, and propagate these.<sup>54</sup>

Finally, Book III addresses music, and thus Kepler's central point of conflict with Fludd. Kepler's separate title page for this book reintroduces Proclus with an important quotation from his comment on Euclid's *Elements*. This states that the mathematical

enterprise of the mind prepares for theology. Because those things that to the uninitiated seem difficult and too lofty to grasp about the truth of divine things, can through mathematical reasons be demonstrated to be manifest and without controversy, *through certain images*.<sup>55</sup>

In other words, mathematical demonstrations, which work through images, prepare the mind for theological truths. This Proclean quotation helps buttress Kepler's claim that one needs to understand harmonics not by means of numbers, or numerology, but through geometrical relations. In Book III, he lashes out at Pythagoras and at one of Fludd's favourites, Hermes Trismegistus, 'whoever he may have been', and who appears to 'Pythagorise', unless Pythagoras may be considered to have 'Hermeticised'.<sup>56</sup> Kepler's own musical harmonies are derived from the geometrical ratios discussed in books I and II of his treatise.

54 Kepler, *Harmonice mundi*, lib. III, cap. 1, axiom 7, in *Gesammelte Werke*, 6, ed. Caspar 104–105: 'Geometria enim, cujus partem huc spectantem libri duo priores sunt complexi, Deo coeterna, inque Mente divina relucens, exempla Deo suppeditavit, ut in hujus libri præambulo dictum, exornandi Mundi, ut is fieret Optimus et Pulcher[r]imus, denique Creatoris simil[is]imus. Dei vero Creatoris imagines sunt, quotquot Spiritus, Animæ, Mentis, suis singulæ corporibus sunt præfectæ, ut illa gubernarent, moverent, augerent, conservarent, adeoque et propagarent'.

55 Ibid., separate title page for lib. III, in *Gesammelte Werke*, 6, ed. Caspar 91: 'Ad Theologiam præparat Mentis conatus. Nam ea quæ non Initiatis circa veritatem rerum divinarum videntur esse captu difficilia & sublimiora, illa Mathematicis Rationibus demonstrantur esse fida manifesta & sine controversia, per quasdam Imagines'. Italics mine.

56 Ibid. 98–99: 'Hermes Trismegistus (quisque ille fuit [...])'; ibid. 99: 'quin aut Pythagoras Hermetiset, aut Hermes Pythagoriset'.



tise, not from arithmetical ratios, and thus he feels that they are based on what he calls 'scientific demonstrability' (*demonstrabilitas scientifica*), as defined previously.<sup>57</sup>

On Books IV and V we may be brief. Book IV applies the celestial harmonies to the explanation of astral influences, and hence to astrology, meteorology, and other physical phenomena. Book V is entirely astronomical. We shall only draw attention to one engraving here [Fig. 9.8] which Kepler calls a *schema*, and which refers back to the famous copperplate included in the *Mysterium cosmographicum* published twenty-two years previously.<sup>58</sup> It shows the sun and the planets Mercury, Venus, Earth, Mars, Jupiter, and Saturn, whose orbits are separated by the Platonic solids. Kepler's argument is that that which Euclid had proven mathematically also explains the number and the location of the planets: there are exactly five solid bodies, and the way in which they can be placed inside each other determines the distances between the sun and the planets. This *schema* also disproves, in Kepler's eyes, the Tychonic scheme according to which the sun rotates around the Earth, and all other planets around the sun. This rivalling scheme just does not make sense from the point of view of the concept of an architectural divinity, as Kepler tries to show visually with his dotted line labelled 'the path of the Sun according to Tycho' (*Tychonii Iter Solis*).

### The Controversy

Having sketched out the similarities and differences between Kepler's and Fludd's theories, we may now turn to the controversy. This started, as mentioned before, with Kepler's three-page commentary on Fludd's work in the appendix to the *Harmonice mundi*. The commentary opens with the justified observation that both authors pursue similar goals. Indeed, Kepler writes, there is clearly a *rerum affinitas*, an 'affinity' between his own project and Fludd's, evident in the very fact that Fludd has given to his third book 'the same title which I have given to my entire work'. Other similarities also adhere, for example, in their use of analogies. 'I do treat various things that are similar to his Macrocosm in my work, such as for example in Book IV, where I make the world an animal; but this is for a very different reason'. Not only do the

57 Incidentally, Book III ends with a political excursus on harmony and its opposite, discord and war, which is connected to the dedication of the entire treatise to the English King James I.

58 Ibid. 297: 'In adjecto schemate [...]'.



FIGURE 9.8 Johannes Kepler, *Harmonices mundi libri quinque* (Linz, Gottfried Tambach and Johann Planck: 1619) 186.

two authors' reasons differ, but their use of analogies in general differ as well: Fludd's are often forced, Kepler maintains, and 'dragged by the hair'.<sup>59</sup>

At any rate, Kepler feels that it is worthwhile pointing out the differences between his own theory and Fludd's. Notably, Fludd's applications of musical theory to the cosmos are, according to Kepler, fanciful, unwarranted, and wrong, and they carry no demonstrative weight. The main problem with Fludd's alleged ratios is that they compare things that are not commensurate—that is, things which could not be measured by the same units: 'I never teach', Kepler protests, 'to seek harmonies where the things between which the harmonies are [supposed to be] cannot be measured by one and the same measure of quantity'.<sup>60</sup> No measure existed by which light and darkness might be compared, or form and matter, nor could musical proportions be projected onto their intersection. By contrast, what could legitimately be compared were 'the two extreme movements of the planets', and since those were mathematical by nature, they could, in turn, be compared with musical harmonies. Moreover, '[Fludd] seeks harmonic proportions in the degrees of darkness and light, without consideration of movement, whereas I am looking for harmonies only in movements'.<sup>61</sup> Important for our current purposes is Kepler's final accusation, which follows immediately on the passage just quoted. He writes of Fludd that:

He takes away some unimportant consonances and develops them out of the interpenetration of his pyramids, which he carries around privately in his soul as a separate painted world, or which he tries to represent from [this interpenetration]. I [by contrast] have demonstrated that the whole body of harmonic consonances (*contemperatio*), together with all

59 Kepler, *Harmonice mundi*, "Appendix", in *Gesammelte Werke*, 6, ed. Caspar 373: 'rerum affinitas'; *ibid.*: 'in priore verò tractatu, qui septem libris absolvitur, tertium librum destinavit Musicæ Mundanæ, titulum eundem usurpans, quem ego toti meo operi præfixi'; *ibid.* 375: 'Hæc vero analogia ut per omnia succedat, sæpe crinibus trahenda sunt, quæ utrinque comparantur'; *ibid.*: 'Etsi vero similia nunnulla Macrocosmicis illis et ego tracto in opere meo: ut quod libro iv. Terram animal facio: at id fit ratione longe alia'.

60 *Ibid.* 375: 'ego nuspiam doceo quærere Harmonias, ubi res, inter quas sunt Harmoniæ, non possunt mensurari eqdem quantitatis mensura'.

61 *Ibid.* 376: 'Ille in tenebrarum et lucis gradibus, quarit proportiones Harmonicas, nullo respectu alicujus motus: Ego Harmonias non nisi in motibus quæro'.

its parts, inhere in the extreme motions of the planets according to certain and astronomically demonstrated measures.<sup>62</sup>

The emphasis lies, time and again, on the contrast between Fludd's private and arbitrary pictures and Kepler's own 'demonstration'. The term 'demonstration' is, in fact, used twice in the last sentence just quoted: 'I have demonstrated' on the basis of 'certain astronomically demonstrated measures', whereby the word clearly carries two different meanings: the measurements made by astronomers are obviously not identical in status to the musical relations that Kepler 'demonstrates' to exist in them.

Kepler's three-page critique of Fludd's work provoked a fulsome reaction from Fludd, which he published in 1621 in a separate treatise, the pompous title of which might translate as: 'The stage of truth in which the tragic curtain of error is parted, the smaller stage curtain of ignorance is raised, and the truth itself is brought forth publicly by its minister, or a certain analytic demonstration'.<sup>63</sup> Cajoled by his publisher Gottfried Tambach into responding to Fludd's treatise, Kepler responded in 1622 with a lengthy *Apology*, the full title of which reads: 'Apology for his work "Harmonice Mundi", against the analytic demonstration of the honoured gentleman Robert Fludd, in which he claims to respond to the appendix of said work'.<sup>64</sup> Fludd's response followed quickly in his 'Musical Monochord of the World', its title too long to be translated here, which appeared later in the same year.<sup>65</sup> On the title page of this pamphlet, Fludd referred to Kepler as a 'great expert in mathematics',

62 Ibid. 377: 'Ille pauculas aliquas concordantias delibat, easque ex suarum Pyramidum mixtura, qua Mundum ipse privatim in suo animo pictum circumgestat, elicit, seu ab illa representari probat: Ego totum corpus Harmonicæ contemperationis, cum omnibus partibus, in extremis planetarum motibus proprijs, secundum certas et ab Astronomia demonstratas mensuras inesse demonstravi'.

63 Robert Fludd, *Veritatis proscaenium; in quo aulaeum erroris tragicum dimovetur, siparium ignorantiae scenicum complicatur, ipsaque veritas a suo ministro in publicum producitur, seu demonstratio quaedam analytica* [...] (Frankfurt, Erasmus Kempfer: 1621). I have taken the English translation of this title from Westman, "Nature, Art, and Psyche" 179.

64 Johannes Kepler, *Pro suo opere Harmonices mundi apologia. Adversus demonstrationem analyticam Cl. V.D. Roberti de Fluctibus medici Oxoniensis, in qua illa se dicit respondere ad appendicem dicti operis* (Frankfurt, Erasmus Kempfer: 1622), reprinted in Kepler, *Gesammelte Werke*, 6, ed. Caspar 381–457.

65 Robert Fludd, *Monochordum mundi symphonicum, seu replicatio Roberti Flud[sic] [...] ad apologiam viri clariss. et in mathesi peritissimi Ioannis Kepler, adversus demonstrationem suam analyticam, nuperrime editam, in qua Robertus validioribus Ioannis obiectionibus, harmonice suae legi repugnantibus, comiter respondere aggreditur* (Frankfurt, de Bry: 1622).

a back-handed compliment intended to restrict the astronomer from the higher realms of understanding. Frustrated by what from the beginning had been an utterly fruitless exchange, Kepler refrained from any further engagement with Fludd. Kepler's judgement was that 'the reasoning of this man resembles the philosophy he adheres to: one could call it a dream story composed of ill-fitting parts'.<sup>66</sup>

However fruitless it may have been, this polemic is interesting for a number of reasons. Importantly, this clash of worldviews revolved around the themes that are also central to the present volume: the status and role of images, and the role and function of human imagination. According to Kepler, a profound difference distinguished his images from Fludd's, and this difference was indicative of the general status of the two works. In the Appendix that triggered the controversy, Kepler defined the contrast as follows:

[H]is work contains numerous pictures (*picturæ*), while mine contains mathematical diagrams (*diagrammata mathematica*) furnished with lettering. You will also see how much he revels in the shadowy enigmas of things, whereas I strive to carry things that are shrouded in obscurity to the clarity of the intellect. His way is the manner of the chymists, Hermeticists, and Paracelsians; my own is the way of the Mathematicians.<sup>67</sup>

My first observation on this passage is terminological and refers to the premise of this essay concerning the need for more precise iconographical terminology, which controversies tend to bring about. In the main body of his own *Harmonice*, Kepler refers to most of his own images simply as *figuræ*, and occasionally *schemata*, but not *diagramma*. As for Fludd, we have already had occasion to notice that he uses a rich vocabulary in reference to his lavish engravings, speaking of *effigies*, *speculum*, *imago*, *emblema*, *figura*, *delineatio*, *mysterium*, *descriptio* and *demonstratio*, albeit without offering a clear definition of any of these terms. It is only when Kepler wished to distinguish his own *figuræ* from Fludd's that he took recourse to the technical and—at the time—rarely used neologism 'diagram'. At the same time, he applied a specific term to the images of his Rosicrucian opponent: *picturæ*, 'paintings'—a term not

66 Letter to J. Seussius of 15 July 1622, quoted and translated in Caspar, "Nachbericht" 515.

67 Kepler, *Harmonice mundi*, in *Gesammelte Werke*, 6, ed. Caspar 375: 'Propterea etiam in ipsius opere plurimæ sunt picturæ; in meo, diagrammata mathematica literis instructa. Videas enim, ipsum plurimum delectari rerum ænigmatibus tenebrosis, cum ego res ipsas obscuritate involutas in lucem intellectus proferre nitar. Illud quidem familiare est Chymicis, Hermeticis, Paracelsistis; hoc proprium habent Mathematici'.

usually used by Fludd, which relegates Fludd's artifacts to the domain of the fine arts and bans him from the exactness of mathematics and the sciences. Kepler's charge is, essentially, that Fludd is either employing creativity in the modern artistic sense of the word, or else, that he delights in the type of enigmatic and obscure riddles so dear to alchemists, Rosicrucians, Hermeticists, and Paracelsians. By labelling his own images 'diagrams', Kepler associates them not only with the profession of mathematics, but above all with a type of compelling certainty that can only be obtained by mathematical demonstration, in which there is neither space for arbitrariness in visual conventions, nor for uncertainty of proof.

Arbitrariness and lack of proof: these are the primary accusations that Kepler formulates with respect to Fludd's images. It is relevant that he connects this arbitrariness not only with the way in which these images are related to the doctrinal body of Fludd's worldview, but also with epistemology, that is to say, with the way in which Fludd generates his images. We recall the charge formulated at the end of his Appendix, of Fludd having arbitrarily chosen a few consonances and having merged them with his private, mental imagery of intermixing pyramids.

For Fludd, of course, it was Kepler who was mistaken. He retorted that it was improper to combine mathematics and physics in the way Kepler suggested; doing so not only resulted in a category mistake, but also in capturing shadows rather than the veritable essence of things. What Kepler tried to explain all too profusely (*multis verbis et longa oratione*) and captured in his geometrical drawings were merely 'quantitative shadows' (*umbræ quantitativæ*) rather than 'substances'; 'external movements' (*motus exteriores*) rather than 'internal and essential impulses' (*actus interni et essentielles*); and 'effects rather than first causes' (*ego causam principalem, ipse illius effectus animadvertit*).<sup>68</sup>

How differently the two men thought about the 'veritable essence' of things may be illustrated by the case of the triangle, which they conceived of in utterly incompatible ways. Kepler combated mathematical symbolism, including that of Plato's *Timæus*, and believed that in the mathematical realm, knowledge meant knowledge of formal causes.<sup>69</sup> For Fludd, by contrast, the triangle was an object of contemplation:

We may therefore say that our pyramidal contemplation is more formal than could be comprehended by a mathematical consideration, because it denotes the occult progression of form within matter towards greater

68 On these accusations see Westman, "Nature, Art, and Psyche" 180 and 111.

69 See Caspar, "Nachbericht" 474.

purity and subtlety, and the way it is led towards maturity and perfection away from imperfection, and from what is fat and dense to what is refined. And in this lies all mystical intention of the harmonics of proportions and of the measures of the Wise.<sup>70</sup>

To Fludd it is obvious that these various types of 'occult progression' cannot be captured in purely mathematical terms, in the same way in which the sympathetic relation between macrocosmic and microcosmic entities will never be described by means of mathematical relations alone, 'just as it has never been the intention of the philosophers, that the natural harmonics consists in geometrical dimensions; after all, the agent [world] soul does not allow for a visible measure'.<sup>71</sup>

Kepler, by contrast, found it absurd that someone should wish to use geometrical drawings if these were not to explain 'geometrical dimensions' and should offer pictures of something that 'does not allow for a visible measure'. Was all of this not evidence enough that Fludd's imagery was not only arbitrary, but also meaningless? Was [Fig. 9.5] not a perfect example to demonstrate the nonsensical nature of Fludd's pseudo-geometrical 'pictures'? There, Fludd had quite arbitrarily divided the radius from the Earth to the limit of the universe into three equal parts, placing the elementary world at the bottom, the ethereal world with the sun in the middle, and the empyrean world at the top, even though he knew full well that these three realms were by no means of equal length. Had he not drawn his geometrical lines simply for the purpose of bringing about a symmetrical intersection of his cones of light and darkness, which had nothing to do with geometrical relations, but with metaphysical fantasies?

Kepler's charge was that, although Fludd had drawn geometrical lines, thereby suggesting spatial dimensions, he was really trying to explain something entirely different, something to do with qualities, not spatial relations. But, Kepler objected,

70 Fludd, *Veritatis proscaenium* 29: 'Dicimus igitur quod pyramidalis nostra contemplatio magis sit formalis, quam ut sub consideratione mathematica comprehendere possit, quoniam denotat progressionem occultam formæ in materia ad depurationem, subtiliationem, et conductionem ipsius ad maturitatem et perfectionem ab imperfectione, et a crasso ac denso ad tenue: Atque in hoc quidem jacet omnis mystica harmoniæ proportionum, et mensurarum Sapientum intentio'.

71 Ibid. 15: 'ita ut nunquam fuerit intentio Philosophorum, quod harmonia naturalis consistat in dimensionibus Geometricis; quippe quod anima agens mensuram non patitur visibilem'.

such unities cannot be depicted otherwise than through equal lines. I, by contrast, unless astronomy provides me with a quantitative measure of such unities, would never use them to number any relations. He, however, insisting on his principles and erecting his pyramid from its base, the large circle of the Earth, declares [arbitrarily] that its apex must be in the empyreum.<sup>72</sup>

Kepler concluded, in his *Appendix*, that Fludd did not grasp the mysteries of the cosmos. In fact, his explanations, Kepler wrote, 'are extremely remote from the most accurate certitude of mathematical demonstrations'.<sup>73</sup>

Fludd's answer to these objections is quite interesting. On the one hand, as Ammann has pointed out, his second answer to Kepler in the *Monochordum mundi* introduces modifications to his harmonic formatting of the universe, reducing the arbitrariness of his spatial ordering of planets and elements.<sup>74</sup> Nonetheless, Fludd once more insists on the superiority of his visual, geometrizing approach to non-geometrical and non-visualizable relations underlying nature. He insists that harmonies are not only to be found in planets, their speeds, and their distances, but everywhere in the cosmos, even where we do not see them directly. About this ubiquity, Fludd writes:

This, I say, is the true harmony of the world, and he who attempts an exploration beyond this harmony, through greater curiosity and all by himself, without divine inspiration, will fail and be failed, as it would be an enormous, impossible and inscrutable business to arbitrate specifically with respect to God and his works and to do so directly.<sup>75</sup>

72 Kepler, *Harmonice mundi*, "Appendix", in *Gesammelte Werke*, 6, ed. Caspar 375: 'Propterea ille totum Mundum ratione semidiametri in tres æquales partes dividit, sat cognitum habens, æquales illas minime esse; sed ideo solum, quia prima unitas, est mundus Elementaris, secunda, Mundus ætherius, tertia, Empyreus; et vero unitates pingi aliter non possunt, quam æqualitate linearum: at ego, nisi testetur astronomia de eadem unitatum mensura quantitative, nequaquam ijs ut unitatibus utor ad numerandas proportionones Harmonicas. Ille tamen, suis insistens principijs, pyramidemque educens ex basi, circulo magno Telluris, ejus verticem ad ipsum apicem coeli empyrei statuit'.

73 Ibid. 377: 'Robertus [...] a Mysterijs illis perplexissimis abfuturum haud Paulo longius, ac ipsæ ab accuratissimia certitudine demonstrationum mathematicarum recesserunt'.

74 Ammann, "Musical Theory" 215.

75 Fludd, *Monochordum* 311: 'Hæc, inquam, est vera mundi Harmonia, et qui ultra hanc curiosius per se sine influxu divino explorare gestiunt, fallunt et falluntur, quia particulariter de Deo eiusque operibus hocque directe disceptare immensum, impossibile et imperscrutabile foret negotium'.



Fludd's response must have been doubly frustrating to Kepler: while deriding Kepler's mathematically precise relations as superficial and as merely capturing shadows, Fludd at the same time tried to eschew Kepler's refutation of his own numerical and spatial proportions by insisting that a true understanding of harmonic relations was beyond the grasp of humans.

The incompatibility between the two authors reaches its peak in the discussion of specific images. Take Fludd's initial response to Kepler's objection that [Fig. 9.5] shows arbitrary relations between two pyramids that have no physical, let alone spatial, meaning. It starts thus:

It is very easy to respond to this objection. Because when you take the ethereal heavens to be male, and the elementary region to be female, with the Earth as its cradle (*matrix*), it is necessary that there be the same and exact proportion between the ethereal heavens and that below, given that the degree to which the female responds must be exactly proportional the action of the male, by virtue of that infallible Platonic maxim, that the forms are given according to the merit of matter.<sup>76</sup>

This argument is likely to inspire in a modern reader a mixture of disbelief and amusement. Does Fludd really not understand that Kepler is talking about spatial distances between Earth, Sun, and the heavens, and not about proportionality of male action and female passion? Fludd himself must have suspected that his answer did not entirely respond to Kepler's objection, and so he adds, somewhat later:

But in order to get closer to the matter of the objection, [Kepler] denies that my unities should be equal, and that they should not be either depicted or measured by an equality of lines. But here, this author shows his ignorance of the natural units, because it turns out that he does not know the weights of nature, without which one arrives neither at the secret of harmony nor at the mystery of the celestial motions. In fact, Hermes

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76 Fludd, *Veritatis proscenium* 27: 'Huic ejus objectioni facillimum est respondere. Nam, si coelum æthereum pro masculo, elementaris autem regio pro foemina habeatur, cujus matrix sit terra, necesse est, ut eadem et exactissima sit proportio inter coelum æthereum et illud inferius; quoniam passio in foemina debet gradu exactissimo respondere actioni in masculo, per infallibile illud Platonis axioma; *Secundum meritum materiæ dantur formæ*'.

Trismegistus said, and rightly so: 'what is above, is just like what is below, and vice versa'.<sup>77</sup>

The modern reader may doubt whether this rebuttal is any better. In the eyes of Kepler, of course, it was not.

As must be obvious by now, the ways in which Kepler and Fludd wished the readers of their respective works to view, read, and understand their images were utterly irreconcilable. Fludd continued to accuse his opponent of not understanding that mathematical relations were empty and meaningless, as they did not manage to capture substances, causes, and actions. He insisted that Kepler was concerned with 'the external movements of things, whereas I am concerned with the internal and essential processes of Nature'.<sup>78</sup> Admittedly, both observations are correct: Kepler was, indeed, engaging with the 'external movements of things', because he aimed to match geometrical ratios to observed motions; and Fludd was, indeed, attempting to capture 'the internal processes' of things. However, for Kepler, the crux was that one could not grasp any 'internal and essential processes' unless one *first* matched geometry to the phenomena. One had to rise from the sensible world via the imaginable world to the intelligible world. There was no shortcut. Fludd, by contrast, had no patience with Kepler's concept of mathematics. He exclaimed: 'The ordinary mathematicians deal with the shadows of quantities; the chemists and Hermeticists, by contrast, grasp the true essence of natural things'.<sup>79</sup> Repeatedly, he contrasts vulgar types of measure, which are numerical, linear, superficial, and corporeal, with his own formal type of measure, which results from the proportions of mystical weights.<sup>80</sup> In his rebuttal, Kepler tried

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77 Ibid.: 'Sed, ut proprius ad rem accedamus, ideo negat, unitates meas esse æquales, quoniam pingi aut mesurari non possunt linearum æqualitate. Hic equidem Author suam in vera unitatum naturalium cognitione prodidit inscitiam, eo quod nescire videtur naturæ pondera, sine quibus neque ad Harmoniæ secretum, neque ad motuum coelestium mysteria perveniri potest. Hermes enim dicit (& quidem rectissime;) *Quod est superius, est sicut illud, quod est inferius, & vice versa*'.

78 Ibid. 36: 'Sed hic tota latet difficultas, quod ipse motus rei naturatæ exteriores excogitat, ego actus internos et essentielles ab ipsa natura profluentes considero'.

79 Ibid. 12: 'Nam mathematicorum vulgare est circa umbras quantitativas versari: Chymici et Hermetici veram corporum naturalium medullam amplectuntur'. For a good summary of these arguments, see Ammann, "Musical Theory" 210–212.

80 E.g. Fludd, *Veritatis proscenium* 27: '[...] hoc est, mensura formali, quæ fit proportionibus ponderum mysticorum, & non mensuræ vulgaris sive numeralis, linearis, superficialis aut corporalis identitate numeranda, utpote quæ mensuræ a Sapientum intentionibus multum aberrare cognoscuntur'.

to argue that there is but one type of geometry, and this reproduced spatial relations, and that he did not know what 'proportions of mystical weights'—a mathematics that despised the superficiality of numbers, lines, surfaces, and bodies—might possibly mean.

### Imaging and Imagination

Much remains to be said about this fascinating controversy between Kepler and Fludd. To begin with, there is the curious fact that the alleged winner, Kepler, seems, upon closer scrutiny, strangely outdated. The opinion expressed, for example, in William Huffman's *Robert Fludd and the End of the Renaissance*, that Fludd stands for the deplorable demise of the Renaissance, and Kepler for the beginning of quantitative modernity, is in several regards wide of the mark.<sup>81</sup> Admittedly the two men differed greatly in their interpretation of nature, in their approach to astronomy, and in the degree to which they relied on mathematics. But Kepler's alleged modernity is based on what, even to many contemporaries, looked like an outdated set of beliefs. Frances Yates's assessment of Fludd—'At a very late date, after the *Hermetica* have been dated and when the whole Renaissance outlook is on the wane and about to give way before the new trends of the seventeenth century, Fludd completely reconstructs the Renaissance outlook'—might also have been applied to Kepler, with the obvious difference that Kepler despised the cult of Hermes Trismegistus.<sup>82</sup>

Kepler's outdatedness is evident from the way contemporaries ranging from the Jesuit polymath Athanasius Kircher (1602–1680) to the Minim mathematician and self-appointed secretary of the Republic of Letter, Marin Mersenne (1588–1648), treated his reasoning. As for Kircher, because of his credulity and his elaborate and lusciously illustrated folio albums, one would associate him more readily with the mindset of Fludd (with whom he was indeed acquainted and whom he sometimes even copied) than Kepler. It seems therefore surprising to find that he took Kepler's image of the nested polyhedra defining the planetary orbs to task in terms that closely resembled Kepler's reproach to Fludd: the proposed orbital structures were, Kircher wrote, a sign of intellectual vanity: it was an 'obscure new harmony' 'wrapped up in such mystical verbage' as to be 'incomprehensible'.<sup>83</sup> Marin Mersenne's criticism was even more

81 Huffman W.H., *Robert Fludd and the End of the Renaissance* (London: 1988).

82 Yates, *Giordano Bruno* 406.

83 Athanasius Kircher, *Musurgia universalis* (Rome, heirs of Francesco Corbelletti: 1650) B 376: 'Hanc vanitatem cum Keplerus quoque consideraret, alteram harmoniam architectatus

thoroughgoing. In his *Harmonie universelle* (1633–1637), whose title is a sort of translation of Kepler's *Harmonice mundi* into the vernacular, Mersenne openly criticised Kepler's theory of the relation between musical proportions and planetary orbits. It had become obvious to Mersenne that sound, and hence also harmonies, relied on motions and vibrations, and that they therefore had nothing to do with geometrical figures, let alone celestial bodies. Thus, he brushed away all of Kepler's work in a single impatient gesture:

I have explained the properties of this division in the book on Motion, and I do not think that the consonances derive from figures, which is why I do not dwell on these symbolical relations and these analogies.<sup>84</sup>

In fact, not just Fludd's premises, but also Kepler's were rendered meaningless in the aftermath of what Ernst Cassirer concisely termed the 'Entmusikalisierung der Welt'—the process by which both musical consonances and astronomical laws were redefined in unrelated physical terms, and the dismissal of the idea that the cosmic order could be grasped through musical theory.<sup>85</sup> To Mersenne, Kepler's musical relations looked just as symbolic and analogical as Fludd's pyramidal relations had looked to Kepler!

The purpose of this essay is not to defend either Fludd's or Kepler's position, much less to declare a winner, but to examine how, in the course of a specific polemical exchange, formerly tacit assumptions about images and their epistemic status were made explicit. Indeed, we have seen how in their original works Fludd and Kepler both drew heavily on their own images, which they assumed to be able to explain, show, persuade, or prove whatever it was that needed to be explained, shown, or proven. In this process, Kepler explained the basis of his imagery much more explicitly than Fludd, and opened his treatise with a fairly developed theory of divine geometrizing. Fludd, by contrast, accumulated image after image, without fully explaining either their origin or

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est, sed ita obscuram, et mysticis verborum involucris intricatam, ut quid sentiat difficulter intelligatur [...]. On this charge see Rebohm, "Harmonikale Kosmologie" 137.

- 84 Marin Mersenne, *Harmonie universelle* (Paris, Richard Charlemagne and Pierre Ballard: 1633–1637) bk. III, prop. 18, 188: 'J'ai expliqué les propriétés de cette division dans le livre des Mouvements, et je n'estime pas que les consonances viennent des figures, c'est pourquoi je ne m'arrête pas à ces rapports symboliques, et à ces analogies'. On the evolution of Mersenne's attitude to Kepler's views, see Lenoble R., *Marin Mersenne ou la naissance du mécanisme*, 2nd ed., (Paris: 1971) 367–370. The quote in question is on 370n1. On the role of Mersenne's musicology in the Scientific Revolution, see Cohen H.F., *Quantifying Music. The Science of Music at the First Stage of the Scientific Revolution, 1580–1650* (Munich: 1984).
- 85 Ernst Cassirer, quoted in Ammann, "Musical Theory" 224.

their status. Whence did, one wonders, his archetypical images of triangles and circles originate? Do they derive from *phantasia*, or from an archetypal comprehension of divine patterns, or from an abstraction from observational data?

As we have seen, such issues were addressed more directly in the course of the evolving controversy than they had been in the initial writings. In this process, the origin, status, and intention of the images became more clearly defined, and the terminology was adjusted as a consequence. We have seen that while the two antagonists agreed on the existence of an invisible realm of natural powers and forces that could be grasped and rendered visible through imagery, the powers and entities they tried to depict were quite different, as were the types of visual means they engaged in doing so. Their dispute was, then, never about the legitimacy of imagery *per se*, but about the legitimacy of specific *types* of images and their legitimacy.<sup>86</sup>

However, it is undeniable that the polemical exchange did not lead to consensus on either epistemology or nomenclature. What to Kepler constituted the type of image with the highest degree of certainty, namely the diagram, was in Fludd's eyes a mere shadowy abstraction of the external aspects of the outward movement of planets and stars. And what in Fludd's eyes belonged to the category of the highest and most uplifting of images [Figs. 9.5 and 9.6], did not, in Kepler's judgement, surpass the status of *picturae*, i.e. artwork.

We are confronted, then, with two approaches to capturing the logic behind the ratios with which God had designed the cosmos, and both had clear shortcomings: Kepler's criticism that Fludd attempted to deduce God's ratios without first having encountered them empirically in the sensible world is certainly a fair objection. But so is Fludd's rebuttal that some of Kepler's basic assumptions were not self-evident, such as the belief that God reasons geometrically, not arithmetically; and that what for *us* are ineffable geometrical figures which cannot be constructed, must also be so for God.

It is here that the role of the imagination in the process of image making becomes a central point of contestation. In what is today certainly considered the most famous of his illustrations [Fig. 9.9], Fludd shows us three worlds: the 'sensible world' (*mundus sensibilis*) affects our senses; the divine 'intellectual world' (*mundus intellectualis*) antedates the creation of the sensible world, but its lowest angelic layers can be accessed by the human soul thanks to the acumen of the mind; and the 'imaginable world' (*mundus imaginabilis*) lies between these two, and its 'shadows' (*umbræ*) can be captured in 'pictures'

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86 On this issue cf. Westman, "Nature, Art, and Psyche" 180.

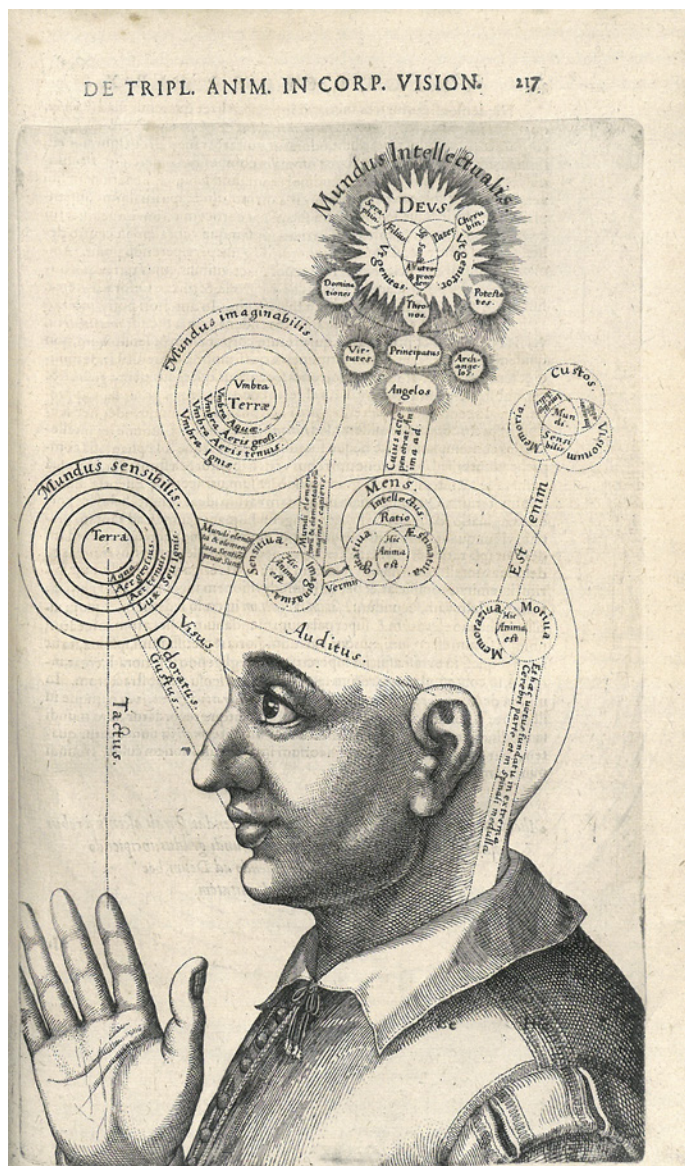


FIGURE 9.9 Copper engraving by Matthæus Merian for Robert Fludd, *Tractatus secundus, de naturæ simia, seu technica macrocosmi historia in partes undecim divisa* (Oppenheim, De Bry: 1618) 205.

(*imagines*) by the 'imaginative soul' (*anima imaginativa*).<sup>87</sup> While in this picture the structural similarity between the sensible and the imaginable world is evident, the link between the intellectual and the imaginable worlds is more elusive. No structural resemblance seems to exist between the two worlds, and it is at best a tenuous link in the human mind, indicated by a vermicular connection (*vermis*) linking the sensitive and imaginative with the cogitative and estimative souls. It is with respect to this treacherous link that Fludd and Kepler proffer different explanations. Admittedly they both believe that the *mundus imaginabilis* provides a bridge between the *mundus sensibilis* of sense experience with the *mundus intellectualis* of divine plans and intentions. They also both believe in the soul's capacity to match eternal, divine 'intelligibles' with 'sensibles', calling this capacity *symbolisatio*.<sup>88</sup> In addition, they also agree with Proclus, who is quoted by Kepler as stating that

the soul has never been a writing tablet bare of inscriptions; she is a tablet that has always been inscribed and is always writing itself and being written on by *Nous* [...]. All mathematical are thus present in the soul from the first.<sup>89</sup>

But the respective *nous* of our two antagonists appears to have suggested different images, and status and legitimacy therefore became contested issues.<sup>90</sup> As Dmitri Nikulin has explained,

In Proclus' argument, imagination, which he boldly identifies with Aristotle's 'passive intellect', provides a *sui generis* materiality for geometrical objects, a kind of 'screen' or 'mirror' onto which discursive thinking (διάνοια) projects mathematical forms, or λόγοι, and makes

87 Significantly, Fludd's three-partite division is the same as Giordano Bruno's, in the above-mentioned treatise on image making (*De imaginum, signorum et idearum compositione*).

88 See Westman, "Nature, Art, and Psyche" 204; on Kepler's epistemology see Walker D.P., *Studies in Musical Science in the Late Renaissance* (London, Leiden: 1978) 44–57.

89 Quoted in Westman, "Nature, Art, and Psyche" 203.

90 For an analysis of Kepler's reaction to Proclus, see Claessens G., "Imagination as Self-Knowledge. Kepler on Proclus' *Commentary on the First Book of Euclid's Elements*", *Early Science and Medicine* 16, 2 (2011) 179–199. For the role of imagination in early modern mathematics, see Guy Glaessens' essay in this volume.

them ‘visualizable’ to an inner gaze of the mind. It is in and with the aid of imagination that discursive reason constructs geometrical things by motion.<sup>91</sup>

Fludd, whose original folding plate was called ‘a mirror of all of nature and an image of art’ [Fig. 9.2], liked the term ‘mirror’. The question is, of course, how such a mirror worked and what it reflected. In Proclus, imagination or *fantasia* was much more restricted than in Fludd, as it was responsible for representing geometrical forms or figures (τῶν γεωμετρικῶν εἰδῶν), which it then submitted to the consideration and for the study of discursive reason (διάνοια).<sup>92</sup> By contrast, Fludd’s mental ‘mirror’ contained a much wider spectrum of images, although he, too (as we have seen in [Figs. 9.5 and 9.6]) regularly subjected them to what he believed was a legitimate mathematical ‘discursive reason’.

Kepler levelled a whole series of objections at Fludd’s procedure, one of which was that his imagination produced ‘geometrical forms or figures’ (to use Proclus’s language) that were not found in nature, in the sense that, for example, the distances between planets as given by Fludd were not those actually measured by astronomers. However valid that objection may be, Proclus will be of no consequence, since the figures of Euclidean geometry that appear in our imagination will not reveal anything about actual relations between real bodies in the physical world.

The most interesting and historically most relevant point about Kepler is that, in astronomical matters, he was open to having his own image-driven cosmological fantasies be corrected by hard empirical data. For his harmonic relations this is, by contrast, not true. As Guy Claessens has rightly stressed, ‘[f]or Kepler it is of vital importance that the terms of the archetypal harmonies are not abstracted from concrete circles in the sensible world, but are essentially present in the soul’.<sup>93</sup> This insistence is closely connected with Proclus’s view of our mental capacities:

Therefore, just as nature stands creatively above the visible figures, so the soul, exercising her capacity to know, projects on imagination, as on a mirror, the ideas of the figures; and imagination, receiving in pictorial form these impressions of the ideas within the soul, by their means

91 Nikulin D., “Imagination and Mathematics in Proclus”, *Ancient Philosophy* 28 (2008) 153–172, 154, 160.

92 Proclus Diadochus, *In primum Euclidis Elementorum librum commentarii* 57.5, 285.21, *et alibi*.

93 Claessens, “Imagination as Self-Knowledge” 186.



affords the soul an opportunity to turn inward from the pictures and attend to herself.<sup>94</sup>

Fludd, too, subscribed to the aprioricity of imagination, which is why he was not willing to accept Kepler's insistence that, as far as spatial cosmic relations were concerned, one had to defer to empirically calculated distances.

A related point may now be made about diagrammatic reasoning. Diagrams, in the sense in which Kepler wished to understand them, can lead to the construction of conclusive proofs from given premises. However, the drawback is that they cannot offer the premises themselves—the definitions and axioms from which one needs to construct the proof. One must try to find these premises elsewhere. Fludd sought them in a mixture of archetypal symbolic imagery, scriptural and Hermetic writings, and alchemical analogies; Kepler felt more strongly bound by astronomical data, although he, too, relied heavily on geometrical and often symbolic imagination. As we have already seen, one of the products of Kepler's earliest geometrical fantasies recurs, in an adjusted and updated form, as the final image of his *Harmonice* [Fig. 9.8]. This image—which emanates a Fluddian breeze of archetypal imag(in)ing—refers back to the nesting regular polygons of the *Mysterium cosmographicum* which define the distances between the planetary orbits. However famous the original drawing may be, it is revealing that it was not picked up by the following generation of astronomers or cosmologists, but mocked, for different reasons, by Kircher and Mersenne alike.

### Kepler in the History of Diagrams

Let us conclude by returning to the question with which this essay began. We have observed the fact that in the early modern period, epistemic images were usually presented as self-explanatory, and that it is only in polemical contexts, when a certain image or type of imagery was contested, that their underlying logic was examined. We have now analysed such a process of clarification in the Kepler-Fludd controversy which, while not resulting in a consensus, still clarified the differences. We have also seen that Kepler, in trying to distinguish his own geometrical constructions from Fludd's images, introduced the term 'diagram' in the conclusion of the argument.

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94 Proclus Diadochus, *In primum Euclidis Elementorum librum commentarii* 151.2–9. Translation from Claessens, "Imagination as Self-Knowledge" 186.

But how much does the word 'diagram' actually clarify? Although the invocation of this technical term introduces, I think, an important step towards a terminological clarification, much work is left to do. To be sure, 'diagram' is a much more specific and technical term than 'figure', but upon closer scrutiny it exhibits an unexpected elasticity, which became even more extreme following the Renaissance. The question arises, therefore, whether we have understood the status of Kepler's geometrical drawings completely once we apply his understanding of 'diagram' to them.

The term, evidently of Greek extraction, appears to have entered the theoretical vocabulary in Latin and the vernacular languages in the sixteenth century. Leaving aside all other meanings without any relation to imagery, we may distinguish, I propose, between mathematical, schematic, and dynamic diagrams.<sup>95</sup> Many of the early uses of the term 'diagram', but possibly not the earliest ones, appear to have made reference to the mathematical type. Nicholas Stone's *Enchiridion of Fortification* (1645) defines 'diagram' as 'a word used by the Mathematics for any thing that is demonstrated by lines'.<sup>96</sup> This definition agrees with that in other vernacular languages. Jacob Eggers's *Neues Kriegs-, Ingenieur-, Artillerie-, See- und Flotten-Lexikon* (1757) states, similarly: 'diagram is called, in geometry, any figure whereby one explicates a proposition or proof'.<sup>97</sup> Of the three types, this is epistemically the most restrictive one. After all, its function was, in John Murdoch's formulation, 'not to facilitate understanding, but to make it possible' in the first place: in the sense discussed above, a geometrical proof is only complete once the drawing has been executed.<sup>98</sup> The diagrams of Kepler's first two, mathematical books of *Harmonice mundi* belong to this type.

The diagram's second meaning, which I propose to call 'schematic', appears to make a more modest claim. It exhibits the shape or outline of an object and the spatial relation of its various components, but does not form part of a formal proof. It 'demonstrates' in a different manner, namely by indicating structural relations that might otherwise be invisible. In the late Renaissance this usage seems to have entered various European languages even prior to the Kepler–Fludd controversy, in the domains of architecture and astronomy.

95 Cf. *Oxford English Dictionary*, s.v. "diagram".

96 Nicholas Stone, *Enchiridion of Fortification* (London, M.F. for Richard Royston: 1645) 74, cited in *Oxford English Dictionary*, s.v.

97 Jacob von Eggers, *Neues Kriegs-, Ingenieur-, Artillerie-, See- und Flotten-Lexikon* (Dresden, George Conrad Walther: 1757), s.v. "Diagramma": 'diagramma, nennet man in der maaßkunde, eine jegliche figure, womit man einen satz oder beweis, erläutert'.

98 Murdoch J.E., *Album of Science: Antiquity and Middle Ages* (New York: 1984) 87.

In what may be the earliest documented (and printed) occurrence, Walther Hermann Ryff, in his German commentary on Vitruvius of 1548, introduces an architectural drawing thus: 'hence we wish to explain Aristoxenes' opinion in writing, and place his visible figure or diagram as an example before our eyes', whereby one feels the author's urge to focus the more general term 'figure' by means of the more unusual, but more precise term 'diagram'.<sup>99</sup> In French, the term also seems to have been used, albeit rarely, in an astronomical context since the late sixteenth century.<sup>100</sup> And by the time of the Kepler–Fludd controversy at the latest, 'diagram' was also known to the English specialist, once again in an astronomical context. In 1618, the year that separates the publication of Fludd's *Utriusque cosmi historia* from that of Kepler's *Harmonice mundi*, one John Bainbridge published an *Astronomical Description of the late Comet* of 1618, which mixed astronomy and prophecy and, like the works of Fludd and Kepler, was dedicated to King James I. In the course of his text, Bainbridge urges readers to contemplate a certain geometrical drawing of a parallax with the words, 'I must entreat you to examine this following diagram'.<sup>101</sup> Nathanael Carpenter's *Geography Delineated Forth in Two Books* of 1635 uses the term in a similar manner: 'To set downe in a Diagram both the number and order of all the heavenly Orbs'.<sup>102</sup> Whereas today the term 'diagram' may denote any type of 'schema', and thus also a schematic drawing of the components of a vacuum cleaner or coffee machine, the early modern use of 'schematic' diagrams was more limited, referring to geometrical constructions such as buildings or the heavens that needed to be drawn with circle and compass. Several of Kepler's drawings in the last three books of his *Harmonice mundi* might be placed in this category.

The final type of diagram, which is 'dynamic', is even further removed from the first, mathematical one, although it too employs lines. To use the descriptive terms of the *Oxford English Dictionary*, 'diagram' refers to:

99 Walther Hermann Ryff, *Vitruvius Teutsch* (Nuremberg, Johann Petreius: 1548) 168a: 'derhalben wir [...] die meinung Aristoxeni schriftlichen erklaren wollen, vnd des selbigen augenscheinliche figure oder diagramma zum exempel setzen'. Cited in *Deutsches Wörterbuch, Gebrüder Grimm*, new ed., vol. 6 (Leipzig: 1983) s.v. "Diagramm".

100 See Jean Édouard du Monin, *L'Uranologie ou le ciel* (Paris: Guillaume Julien: 1584), cited in *Grand Larousse de la langue française en 6 vols.* (Paris: 1972) s.v. "diagramme".

101 Bainbridge J., "Astronomical Description of the Late Comet from the 18. of Novemb. 1618. to the 16. of December following. With certaine Morall Prognosticks or Applications drawne from the Comets motion and irradiation among the celestiall Hieroglyphics. By vigilant and diligent observations", published in *General Chronicle and Literary Magazine* 3 (1811) 265–272, 365–376, 463–474; text and diagram at 370.

102 *Oxford English Dictionary*, s.v. "Diagram".

a set of lines, marks, or tracings which represent symbolically the course or results of any action or process, or the variations which characterize it; e.g., the intensity of action or quality, the rise and fall of temperature or pressure, of the death-rate, rate of emigration, rate of exchange, the derivation and mutual relation of languages, etc.<sup>103</sup>

Here we are still dealing with 'a set of lines', but the lines no longer necessarily refer to spatial relations, as was the case for the other two types. As the words 'intensity of action or process', 'variations', 'rise and fall', or 'derivation' signal, we are now confronted with relations that often (although not exclusively) involve a temporal dimension. The lines in such diagrams no longer refer to geometrical space, but rather to relations between magnitudes, either between each other, or over an extended period of time. Surprisingly, the *Oxford English Dictionary* attests the first occurrence of this third meaning for the period after 1839.<sup>104</sup>

It is important to stress that some of the astronomical diagrams that we have mentioned in fact fall between the second and the third categories. While a situational drawing of planetary positions might count as a schematic diagram, an orbit or a parallax, when drawn, does sketch spatial relations that only become evident over time. In other words, the diagram may be schematic, but the 'schema' itself implies a timeline; this timeline is, however, not made explicit. In other words, then, a complete taxonomy of diagrams might therefore benefit from the introduction of additional distinctions.

Indeed, a history and typology of the diagram has yet to be written, together with an analysis of the explanatory or demonstrative power that each type possesses, or is purported to possess. What is evident is that even though he insisted on the superiority of the mathematical demonstrability of his diagrams over Fludd's fantasy-generated 'paintings', Kepler tried to transfer the weight of the deductive proof associated with the first, mathematical diagram to other, not entirely congruent types of imagery. Nevertheless, it is easy to overlook the illegitimacy of some of his extensions while blinded by the success of his mathematical laws of planetary motion.

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103 Ibid.

104 Ibid. This late date is baffling, as the introduction of a timeline into geometrical figures goes back to the later Middle Ages, Nicholas Oresme's fourteenth-century drawing accompanying the so-called mean-speed theorem being the most famous example of such a 'dynamic diagram' (evidently *avant la lettre*).

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## Aristotelian Proportioned Images and Descartes's Dynamic Imagining

*Dennis L. Sepper*

The contributions to this collection leave little doubt that the imagination is contested ground. As the various essays show, thinkers have tried to bridge, with regard to the imagination, thought and sensation, spirit and body, soul and action, the fictional and the real, and, more recently, the innovative and the routinised. The imagination has been a staple power of human psychology and psychophysiology, but it has also served as a venue for conceiving distinctive, even extraordinary, actions and influences: divine and demonic apparitions and operations; strong minds exercising control over weak; matter being affected or changed by soul; and fictions becoming reality. Various corresponding psychologies and physiologies of the imagination have been devised, as have imaginative pragmatics and technics. By the time we reach the threshold of the early modern period, we seem to be very far from the comparatively staid beginnings of imagination theory in ancient Greece. A task of this volume is to understand the bewildering variety of aspects and functions that the imagination accrued, particularly in the early modern period. One possibility is that the resulting agglomeration amounted to a massive equivocation. Perhaps the only thing that unifies everything thus attributed to the imagination is the name—a name that itself has been subject to not insignificant variations and changes (*eikāsia*, *phantasia*, imagination, fancy).

The only way to make a determination is to undertake an inquiry that is both philosophical and historical, with the aim of elucidating, in theory and in reality, the concept of imagination. The single most important figure here is Aristotle. But we moderns and postmoderns cannot avoid dealing also with a second figure, one of the later historical authors treated in this volume: René Descartes. This essay examines the deep developmental connection between Aristotle and Descartes and the anthropological and psychological coherence of their respective conceptions of the imagination.

### Reaching Back to the Past of the Imagination

In at least one sense, this is a fruitful time to investigate the imagination as psychological power, historically and in principle. Having made significant advances in the understanding of vision and memory, the experimental cognitive and neurological sciences are poised to focus their attack on the imagination. One problem, however, is that we do not yet possess a descriptive vocabulary and basic phenomenology of the imagination anything like the vocabulary and phenomenology that preceded the recent studies of memory. Moreover, we are rich in techniques and technologies for testing and measuring the durability and accuracy of the results of memory; we are not so well equipped in the case of the imagination.

Compared to the investigation of memory, the investigation of the imagination is more deeply troubled with late-nineteenth-century worries about the legitimacy of introspection. These worries led, in professional philosophy and psychology, to what has since been called *antipsychologism*.<sup>1</sup> Antipsychologism and its best-known representative, behaviorism, are methodologically justified. But when these schools of thought dogmatically rule out any and all appeals to private first-person psychological events, that impedes psychology empirically, theoretically, and philosophically. This in turn accelerates our alienation from our own experience, and we gradually lose the habit of speaking about commonly experienced psychological events in discriminating ways. There may be more reason, often, to trust the descriptive acuity of Hugh of Saint Victor or Theresa of Ávila as they engage, explore, and disengage the range of human psychological powers than to trust the latest work based on functional magnetic resonance imaging studies that use modernly conventionalised psychological terms. In that sense, antipsychologism can obscure our ability to see and conceive mind and soul.

One might still, however, accept historical and methodological arguments in favor of antipsychologism. Historically speaking, after Kant we can no longer naïvely depend on traditional conceptions of ancient and medieval psychological theory (including the internal senses of common sense, memory, and imagination) in order to explain how the mind works and what makes knowledge possible. Kant himself is the crucial turning point. Even the changes he made to the 'deduction of the pure concepts of the understanding' between the first and the second editions of the *Critique of Pure Reason* show his increasing reluctance to use the traditional conceptions of the human

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1 Kusch M., *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (London: 1995).



psychological faculties. The first, or 'A' version approached understanding by proceeding from the intuitions of sense to the reproduction of presentations by the imagination, and then moving on to the conceptual recognition of presentations by memory. The 'B' version, by contrast, started with what in 'A' was part of the conclusion: the mind's original power of the synthetic unification of apperception. Kant had no particular quarrel with concepts of empirical psychology, but he was working to counter the tradition of *rational* or *meta-physical* psychology that accepted without critique too many casual ontological commitments implied by the vocabulary of traditional philosophizing.<sup>2</sup>

Kant is taken to be the first thinker to develop the principle of anti-psychologism.<sup>3</sup> However, there are simpler objections to the old psychological theory. For example, if the basic model one has of the imagination is the forming and holding of visual pictures in the mind without the direct involvement of sensation or event memory, then a hornet's nest of epistemological challenges immediately arises. If you imagine Hamlet, what is the colour of his eyes? If you imagine a building that resembles the Panthéon, how many columns does it have? How can you or anyone else know that Hamlet or the building you imagined yesterday is the same as the one you are imagining today? What is the 'stuff' out of which your mind-pictures are made? The inability to answer such questions contributed to the rise of behaviorist methods and ultimately to the claim that mental appearances may be epiphenomenal or illusory. These concerns have been so pervasive that only recently in psychological circles has it become legitimate again to affirm the existence of privately perceived images.<sup>4</sup>

Ancient Greek philosophers did not always or even often discuss such phenomena as matters of irreducibly private experience. Neither did they cultivate

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2 Using the conventional designation 'A' for the first edition of the *Critique of Pure Reason* and 'B' for the second edition, the corresponding deductions are A 95–130 and B 129–169. The progression from sensible intuition to memorative recognition is at A 98–110; the basic theory of the original 'synthetic unity of apperception' is presented at B 131–139. The most fundamental ontological commitments of traditional psychology are critiqued in the section on the paralogisms of pure reason, also completely revised between editions A and B (cf. A 348–405 with B 406–432).

3 According to Kitcher P., *Kant's Transcendental Psychology* (Oxford: 1990), Kant is far less anti-psychologistic than he is commonly thought to be: he eliminated as much rational psychology as possible, but retained the minimum necessary for critical philosophy (for instance, the fundamental difference between the experience of the manifold of sensibility through intuition and the understanding's conceptual grasp of what appears in the manifold).

4 For a triumphalist account by one of the leaders of the pro-image movement, see Kosslyn S.M., *Image and Brain: The Resolution of the Imagery Debate* (Cambridge: 1994).

a ready-made portfolio of psychological concepts and theories by which to interpret them. In an important sense, the very notion of the image and a corresponding power of knowing an image as *of* a thing arose in Greece from questions about the *being of appearance* and about how natural things convey their likenesses to perceivers—that is, from metaphysical-ontological and physical-scientific concerns. These ontological and physical frameworks were still present, and decisive, for Plato and Aristotle. Aristotle may after all have decisively shaped the psychological interpretation of the imagination, but he did this in the first place as a physicist or natural philosopher, as a student of *phusis*, or nature. If the imagination was a motion—even though this motion was strongly associated with psychological appearances—then the topic of the imagination was first of all a physical one, since by definition physics was the study of motion and change.<sup>5</sup> That, combined with passages in Plato that conceived divine and intelligible forms as imaging themselves in matter, provided to the theory of images and the imagination a basis that allowed for wide-ranging reverberations and developments through the centuries.<sup>6</sup> Images could be produced by extra-human things and affect both the soul and matter; in animals and human beings the imagination was a power that used the stuff of perception to make likenesses of past, future, and fictional deeds and things.

### Aristotle's Psychological Home for the Imagination

For Aristotle, the motion that started in sensation but continued in the body in order to produce similar appearances anew—imagination, in the technical sense of his concluding definition of *phantasia* in Book III, chapter iii of *De anima*—had a distinct destination unique to human beings. According to *De anima* and the related texts known collectively as *Parva naturalia*, the occurrence of phantasms in animals (*phantasmata* in Greek, singular *phantasma*) enabled purposive or purpose-following behavior. Aristotle called that *sensory imagination* (*De anima*, III, xi, 434a 5), which could be simple and indistinct in animals with the simplest sense organs but much more complex

5 See Sepper D.L., *Understanding Imagination: The Reason of Images*, Studies in History and Philosophy of Science 33 (Dordrecht: 2013), esp. chapters 4 and 5. The centrality of the topic of motion to the study of nature comes up in the second chapter of Book 1 of Aristotle's *Physics*.

6 Most notably in the passage of the *Timaeus* where the human liver is portrayed as reflecting messages from the gods in sleep (70d–72c), and in the stories of the divided line and the cave in the *Republic* (509d–518b).

and distinct in higher animals. The character of animals' phantasms depended on the number and acuity of the sense organs (which could be more acute than those of human beings); the ways in which the phantasms could be separated and combined; and the manner in which they could be preserved as short- and long-term memories of things and events. Animals well equipped with external and internal senses could rise to very sophisticated levels of purposive behavior. None of which, however, required intellect.

Leaving aside special consideration for the special intellectual imagination of the human animal, animal imagination presupposed the complex economy of the animal psyche (soul). It is perhaps only a slight oversimplification of Aristotle's psychology to say that the soul is the interactive functioning of the parts of the animal. The animal's 'consciousness,' in turn (if we may be allowed this anachronism) is an interactivity of sensation and any other sensitive powers the animal has: common sense, imagination, and/or memory. In nonhuman animals that is as far as things go. The phantasms with which such animal souls operate are derived from or affected by sensation, common sensation, memory, and imagination. A dog that notices a piece of meat on the other side of a long fence uses sight, smell, spatial position, memory, and a kind of comparative imagining as it goes through different routines (say, jumping or digging) before it runs fifty meters to an opening in the fence and then trots back to devour the meat.

Human imagination can work in a similar way, but there is the additional component: reason, the intellective or thinking power unique to human beings. Aristotle is very clear about the relationship between thinking and phantasms: there is no thinking without them.<sup>7</sup> This became a slogan for Aristotelians through the centuries. A related Aristotelian slogan is that whatever is in the intellect was originally in sense. That, in essence, is a variant on the idea that no thinking occurs without phantasms. Phantasms are the motion-continuation of sensation that, like the original motions involved in sensation, give rise to similar appearances (in memory and imagination). The forms that are the object of intellect are known precisely *in* the phantasms.<sup>8</sup>

One of the deepest prejudices of professional philosophers and historians of philosophy is the assumption that reason, if only in the form of logic, rises above the materiality and quasi-materiality of the outer (vision, hearing, etc.) and inner (common sensation, memory, imagination) senses and ultimately leaves them behind for the contemplation of pure form or ideas. In this sense,

7 He says this in both *De anima* (Book III, chapter vii, 431a 14–16) and *De memoria et reminscencia* (chapter 1, 449b 31–450a 1).

8 Aristotle, *De anima* Book III, chapter vii, 431b 2–3.

they are logical Platonists. The radical nature of Aristotle's claim, which even many Aristotelians ultimately betray, is that this never happens. Intellect can think intelligibilities only in the presence of phantasms and with respect to them. One might state this as a simple formula: for Aristotle, reasoning is what human beings do with and about images. (This topic turns out to be crucial for entering into the imaginative world of Descartes.)

Immediately after designating what the imagining animal does as *sensory imagination*, Aristotle describes a more complex imagining. In an animal that can reason (there is only one that Aristotle knows, but he formulates the issue with typical caution), there is another kind, *deliberative imagination*, because 'whether one will act this way or that way is already a job for reasoning, and has to be measured by one criterion, since one is looking for the greater good, and thus is able to make one thing out of a number of images'.<sup>9</sup> The psychological writings of Aristotle are marvels of complex compression, so we should not be surprised that he gives little further explanation in this passage of chapter xi. To figure things out, it is necessary to look to earlier chapters in Book III of *De anima*, where he lays out his conception of how the intellect understands. Two powers cooperate in human understanding: the active, 'making intellect' (*noûs poētikos*) and the passive, 'receiving intellect' (*noûs pathētikos*). Little can be said here about these notions, which are among the most controverted in the history of Aristotelian exegesis, but it is possible to highlight features of special relevance to the role of the imagination in knowing.

Following the discussion in chapter iii of the imagination, chapters iv through viii of *De anima* address the knowing part of the soul and how thinking comes about. Unlike sensation, the thinking potency has few intrinsic determinations and thus is most properly the place of forms in the soul—it can think anything, whereas sight can see only the visible. After distinguishing thinking from sense perception, Aristotle discusses magnitudes (which include all things physical and mathematical) and different ways in which they are thought. He emphatically differentiates, for example, between the thinking of a magnitude and the thinking of the being of a magnitude; the thinking of water and of being water; of flesh and of being flesh. He then mentions one of his favorite objects, the 'snub nose': 'For flesh is not present without material but, like a snub nose, it is this in that'.<sup>10</sup> The question Aristotle is immediately pursuing is whether the soul recognises (1) the *essence* of flesh and (2) fleshly *objects* with one combined or two separate powers, a distinction that can be similarly applied to the snub shape of a nose without the nose's matter

9 Aristotle, *De anima* 434a 7–10.

10 Aristotle, *De anima* 429b 10–14.

and the snub nose itself (actually shaped matter). More generally, he asks whether the power that apprehends and considers the natures or essences of things is the same as or different from the power that apprehends and considers actual things that possess such natures. Aristotle's consistent preference, when there is no compelling reason to postulate two powers for closely related tasks, is to conceive the part of the soul involved as the same in each case.

The relevance to imagination becomes clear if we note that in *De memoria et reminiscencia* Aristotle points out that we can look at a picture either as a picture or as an image of the thing it pictures. This is to move from awareness of a present object (the material object, such as paint on a wall or ink on paper) to awareness of an absent object (the person or scene portrayed in a picture). He then points out that we can use a diagram of a triangle in a similar way: in fact we can use a single triangle, whether drawn or imagined, to think quite different things.

And in the same way, one who is thinking, even one who is thinking of something that is not a quantity, sets a quantity before one's eyes, though one does not think it as a quantity, but if the nature of it is among things that have a quantity, but an indefinite one, one sets out a definite quantity, but thinks it just as a quantity.<sup>11</sup>

In sum, these passages make clear that thinking, which for Aristotle requires phantasms in order to occur, is not simply gaping at a present image. Thinking involves taking the phantasm *in a certain way*, against one background rather than another, as itself (a mark on paper) or as standing for one or another or a third kind of thing (a line segment, or the side of a triangle, or the constructed solution to a geometric problem, or the fence between two plots of land). Imagining requires not just an image, but identifying that image as representing something in an appropriate field or context of concern. The ability to change that field or context of concern is something that reason does with images. This imbues the process of thinking with a universal flexibility of concern and a correspondingly flexible use of images in a way that no other animal can equal.

In Book III, chapter vii of *De anima*, Aristotle mentions seeing a light in the dark of night, noticing it is moving, and then recognising it as an enemy advancing to attack. He continues: 'but sometimes, by means of the imaginings and thoughts in the soul, just as if one were seeing, one reasons out and plans

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11 Aristotle, *De anima* 450a 3–7.

what is going to happen in response to what is present'.<sup>12</sup> In the case of the moving light he is suggesting something like a natural inference from images to objects. In the case of reasoning and planning, he is suggesting a dynamic process involving many different images, with some perhaps dynamically changing, and many thoughts we can have about these different images in order to conceive what will or should happen in the next moments or the more distant future. The example of the moving torch is a case of the deliberative imagination he identifies in chapter xi as an occurrence of reasoning about human praxis. Given that chapter vii tries to characterise the process of thought per se, not just in terms of its theoretical, poetic, or practical qualities, he is indicating the rich multiplicity and complex dynamism that is involved in thinking with images. This is imagination in the full human sense: first possessing it in the sense that animals have it, and then expanding and deepening it by the human power of reason's diverse and differential grasp of images.

One more point about Aristotle is in order here, although I can do little more than hint at it. Recall that Aristotle defined imagination as a motion that starts from sensation. In developing the corresponding theory of sensation in *De anima*, Book II, he argues that each channel of sensation is articulated by at least one pair (typically several) of opposing qualities, such as black and white in vision or sharp and flat in tone. He also argues that sensory change is the movement of a quality positioned between these opposites, either toward the first and away from the second or vice versa. Moreover, he understands sensation to be, or at least to be based on, some kind of proportion, which measures the position of any particular quality between its two opponent extremes. (This is a fundamental topos of ancient Greek thought, based on the Pythagorean discovery of the correspondence of harmonies to simple differential proportions of the lengths and tensions of vibrating strings.) Because of this proportionality, reason has a way of thinking about the qualities of images that is quite literally rational, i.e., based on ratios. In Book III of *De anima*, he asserts that the soul does not think without images immediately after he discusses how qualities such as white, sweet, and hot might simultaneously be thought in complex mathematical proportions to one another.<sup>13</sup>

The field-contexts of concern in thinking have, therefore, structures that can be calculated, ordered, and often even measured. For every opposing pair of characteristics that marks the field, there is an axis along which different

12 Aristotle, *De anima* 431b 8–11.

13 Aristotle, *De anima* 431a 20–b 2.

proportions that correspond to different intermediate characteristics can be determined. Because imagining works in the first instance to produce qualities like those sensed, it works in accordance with these differential ratios of sensible qualities in their relevant fields. This in turn means that imagining has an implicit rational basis. Because it has that basis, intellect can recognise proportions in images and work with them, and by means of this rational work can achieve levels of understanding far beyond simple apprehension of a phantasm and its relation to a second phantasm. Furthermore, since there is no thinking at all without images, Aristotelian intellection is by its nature constantly and without fail engaged in such work: it is an activity that grasps images in a plane of concern, measures them, and compares and (re)combines them; and each step leads to the possibility of a new insight and a consideration of a new image with respect to those it has already considered.

The phantasm, then, in a strictly Aristotelian sense, is the continuation of proportionalised appearance-causing motions that commence in sensation. A specific sensation is itself an activation of just one of the possibilities of the sensory field between opposites. Notably, in being activated in sensation as a specific colour, the sensory field simultaneously becomes *otherwise* actively potentiated as well: potentiated for movement away from the activated hue in either of the two opponent 'directions', e.g., the direction toward black or the direction toward white. This positioning motion between the extremes is orderly, proportionalised, and measurable. With colour, the path between black and white is a more or less continuous range. The phantasm that *phantasia* produces in the mind is a follow-on appearance: without the original stimulus-object being present, imagination activates the colour field in a manner that corresponds to the activating motion of the original sensation. Analogous claims can be made for each of the other senses and their basic modalities.

We should not be too bothered by the reflection that this kind of explanation is based on antiquated, even erroneous, 'science': for example, that although Aristotle believed colours to consist of an admixture of white and black, we now know that this is wrong. Even if it is indeed wrong, that does not discredit Aristotle's approach and its strategies. Our own psychophysical theories are still based to a surprising degree on opponent pairing and proportionality. We still use black and white as a crucial axis for vision and colour, and we have added to it other qualitative pairings (colours that contain no white or a great deal of white; highly saturated and unsaturated colours; oppositions of red-green and of yellow-blue, etc.) in order to consider the corresponding 'field' of colours to be thus differentiated in two or three or even more dimensions, whether virtual or real.

## The Conceptual Topology of Imagination

Elsewhere I have characterised the planes of concern involved in this type of imagination as *conceptual topologies*.<sup>14</sup> A conceptual topology is an experiential field, a field of possible appearances, which has been marked through experience by basic concepts and conceptual structures. A conceptual topology for imagining thus has a ground, based ultimately in individual and combined senses, from which it can make projections and variations. Because it is conceptually marked, the topology is culturally marked as well, not least by language. The conceptual topology (as a field) is the structurally articulated place where all appearances of a certain type can appear in the context of their relationship to other similar appearances. One conceptualised field can, by virtue of its structure, be analogised and even proportionalised to other fields (again, this is a generalisation of Aristotle's argument that we can correlate things such as whiteness, sweetness, and heat using proportions, as mentioned several paragraphs above).

For more than two millennia a basic conceptual topology has governed the theory and the experience of the imagination wherever Aristotle (or Plato) had a strong influence.<sup>15</sup> One major feature of this governing conceptual topology—which is in fact a topology of *emergent appearance*—is the conviction that imagining is basically a biplanar phenomenon. That is, imagining typically works by moving between different fields or spaces of concern and by producing and discovering through this movement metaphors and analogies of form that can guide new appearances. However, this is not to suggest that imagination is something purely formal or formalizing. Rather, the claim would be that there is no such thing as pure form, or at least anything that we human beings are capable of knowing as such. All form is instantiated, embodied, incarnate, materialised: the power of form is the power to give order to appearance within the substratum of an imaginative field or space, and to project these forms to others—whether in the same substratum or in different ones. In this sense, language and even supposedly pure logic are imaginative, a fact that becomes all the more evident when language is interpreted in terms of the Saussurean sign. That, too, is an elaboration—a very bold one—of Aristotle's claim that there is no thinking without phantasms.

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14 Sepper, *Understanding Imagination* esp. chapter 3. A more careful approach here would distinguish between conceptual topologies and the more specific *conceptual topographies* that instantiate them.

15 For Plato, see Sepper, *Understanding Imagination* chapter 4.



Just as antipsychologism has in several ways blocked access to the imagination, so too, since the eighteenth century, has the cult of creative genius. Effective imagining, which even in its simplest forms is the emergence of appearances, often begins with slight variations from fact, and it prospers most when it is grounded in rich factual experience. By the same token, creativity typically presupposes a long period of apprenticeship in successfully matching variations of real things and already existing images of them, in becoming familiar with the variety that real-world appearances have to offer, and even in routinizing them. A chef's imagination is a simple but not atypical example of normal, creative, and routinised imagining. In its simplest form it involves placing, say, a slightly new aroma with respect to some others and determining or anticipating the distance between them according to degree of a certain quality (say, pungency). The aromas come to be experienced and treated as distinct but real positions in an aroma-space. This kind of simple, proportion-alizing, quality-focused imagining precedes the chef's process of trying out recipes that feature the new aroma. She similarly imagines textures, colours, flavours, and even sounds (e.g., the crunch of celery, or the different kind of crunch of good *pommes frites*). These elementary sensory forms are then included as features in more complex imagined spaces and scenarios: in the combination of food items on the plate, seen against the background of the table setting and the décor, planned according to what products are available fresh (or possibly frozen), placed in the flavour-sequence of the courses to be served, and with regard to the wines that might accompany the different plates. This imaginative placement or topology always features a certain *concreteness*, and an anticipatory concrete projection, with respect to the focal features of concern; but to become the property of imagination these features must also be *abstracted* from previously experienced real characteristics of objects and events. Moreover, because of the placing and place-aspect of conceptual topology, there is both an inside and an outside to imagining. We imagine *inside* an appropriate imaginative space, which is *outside* the ambient physical reality; we also imagine *in* qualitatively simplified spaces that are *external* to other spaces both simple and complex. This imagining does not have to be inward and introspective, at least not in every respect. With appropriately methodical care one can avoid violating the legitimate strictures of antipsychologism. The real test of the chef's imagination, after all, is in the food.

Philosophers and psychologists have long treated the phantasm or image as a fixed unit of experience. In modern empiricism (Hobbes, Locke, Hume, e.g.) these units are like data units isolated from all others. Only when they have entered the mind through the senses do they undergo distinction and analysis according to contiguity, resemblance, and cause. These image-atoms

are joined, by dint of the biographical particularities of the individual's experience, in a network of associations. Aristotle implicitly rejects this atomism and 'idiocy' of images.<sup>16</sup> Images of the same kind are naturally associated precisely by our natural sense endowment; each sense has its typical and appropriate field. Images are not simply acquired from the outside, because we already potentially have them by nature within the boundaries of our sensory powers. Moreover, reevoking the phantasm—that is, engaging in actual imagining or even remembering—is not in the first instance a question of simply reproducing exactly (perhaps with lesser vivacity) an original image. Rather, it is a matter of emergent (re)appearance: an activation of the field that underlies sensibility, within which something like an original appearance appears again in implicit—and, with the proper use of intellect, explicit—proportional relationship to others in the same field.

### Mathematics and Imagination in the Early Descartes

One of the ironies of modern intellectual culture is that although mathematics is ordinarily taken to be a preeminently rational activity, the great 'rationalist' mathematicians of the seventeenth century (in particular Descartes, Pascal, and Leibniz) understood it to be imaginative.<sup>17</sup> A simple example can show enough to let us grasp the relevant imaginative features. Consider a straight line. First: the words 'straight line' place us on the verge of imagining, of emergent appearance; they potentiate the actual imagining of a line (segment) in some type of space. In the next step, we might conceive this straight line as indicated by 'AB', with A and B understood (or imagined) as two points on the line. In a third step, we conceive it as a short or long segment, as a ray (infinitely extending in one direction from a point), or as a line in the strict mathematical sense (infinite in both directions from any point on the line, without breadth). These stages and possibilities are encompassed by the idea of imagining a line. Immanuel Kant incorporated such considerations into his notion of schematism.<sup>18</sup> Granted that schemata, as products of the imagination 'in its transcendental use', are peculiar to Kantian philosophy, they nevertheless

16 The *idiōtēs* is the individual in all the peculiarities of its private existence. It was the genius of Ernst Mach to take the idiocy of the data bits of experience to a logical extreme.

17 See Sepper D.L., "Spinoza, Leibniz, and the Rationalist Reconceptions of Imagination", in Nelson A. (ed.), *A Companion to Rationalism* (Oxford: 2005) 322–342.

18 Schematism, presented in the *Critique of Pure Reason*, is in Kant key to implementing the pure concepts of the understanding in the manifold of sensibility.

have a more commonplace and general plausibility, because they account for the universally acknowledged regularity and reproducibility of mathematical figures and concepts, and express a common experience of imagining mathematical objects.

It can be argued that although two- and three-dimensional geometry might inevitably have a certain imaginative character, many other branches, such as algebra, do not. It could be counterargued, however, that we should not casually assume that all images have to be spatial—in Aristotle's conception there are phantasms of hearing, tasting, and smelling, none of which are intrinsically spatial. It is even possible that the production of symbols and operations on those symbols is imaginative as well. If the imagination is a power of producing appearances (never mind what kinds of appearances—they do not have to be red, sour, or three-dimensional), then even the most abstract language of philosophers and the calculus of symbolic logic would be in some sense imaginative. A painter deploying colour or line, a parent thinking about what his child's experience of a new school might be like, and a scientist transforming a data set into the terms of tensor calculus are not engaged in fundamentally different kinds of activity in this respect. They are all cases of comparative, rational, or quasi-rational imagination.

Whatever the complications of Descartes's relationship to prior philosophical and scientific traditions, he was the respectful heir of the tradition of the imaginative character of mathematics. His early thought is steeped in its elements. In particular, in newly radical ways he thought through the implications of the imaginative power and its proportionalizing capacities. The insights he gained led to one of his greatest accomplishments: the invention of analytic geometry. Let us look at how this began.

From the beginning of his intellectual career, Descartes thought that imagining could be practised, improved, and made methodical. This was the aim of one of his very earliest works, the *Regulae ad directionem ingenii* (left incomplete, probably ca. 1630). His notebooks from the early 1620s are filled with reflections on imagining and examples of attempts to foster a dynamic imagination guided by intellectual insight. Most of these attempts are connected with solving physics and mathematics problems, although some evince a playful experimentation with simple figures (one curve slides along another; a line segment rotates; one line segment revolves around another taken as axis and produces a solid). In his earliest extant complete treatise, the *Compendium of Music* (*Compendium Musicae*, offered as a New Year's gift for 1619 to a friend), he announced psychophysiological postulates that described typical human reactions to tones and their relations of intensity; sound is of course the object of sense that has almost from the beginning of formal inquiry been regarded

as based on proportion. He then provided a brief and suggestive account of how our sense of rhythm in listening to a song involves taking the proportions the senses have detected (that is, ones we perceived a moment ago and now remember) and imaginatively projecting them into the future.<sup>19</sup> This process is not so much an intellectual one as an embodied, spontaneous, dynamic synthesising of present and past to anticipate a future that will come by virtue of the proportional forms of sensation.

If we are haunted by the historiographical claim that Descartes rationalised and mathematised thought, we are likely to be oblivious to what he was actually doing as he developed his method, invented what we call analytic geometry, and devised a new science of nature. Perhaps we are too much in the modern (and not merely post-romantic) habit of pitting reason against imagination, and the sobriety of science against the creativity of the arts. Descartes painstakingly worked through the consequences of traditional imagination theory. The result was the insight that what the senses, common sensation, memory, and imagination make present to the mind as images are the apparent forms of all our experience and knowledge, and that these image-forms can be analysed and synthesised proportionally in order to exploit and maximise the information they contain. Here we need to hold in our minds an ample sense of the word 'information', since today we have an ever more pronounced inclination to think of information as intrinsically and essentially composed of bits. *In-formation* begins from the fact that what presents itself to us in the first place is already well formed in some context or framework. What the senses, the common sensation, the memory, and the imagination present all express form and have their own respective formats. But some formations are less apparent than others, and both the latent and expressed forms of appearances can be enhanced, configured, and reconfigured as we focus first on one, then on another, and try to develop from a more elaborated experience a deepened sensibility for both hidden and patent forms.

No original manuscript of the *Regulae ad directionem ingenii* is extant, so it is not possible to confirm, but the title was probably devised by an editor rather than Descartes. The title is, in any case, a good description of the content. The book presents rules—thirty-six were intended, though it leaves off right after the twenty-first rubric—that methodically regulate the use of the human being's basic cognitive and protocognitive abilities for the sake of knowing. Rule 8 holds that there is no more useful inquiry than that of determining 'what human knowledge is and how far it extends'. Although properly speaking it is intellect that is capable of science, it can be helped or impeded by the

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19 Descartes R., *Oeuvres complètes*, ed. Ch. Adam – P. Tannery, 11 vols. (Paris: 1996), vol. 10, 94.

three powers of sense, imagination, and memory. When, under the rubric of Rule 12, he examines these faculties, Descartes concludes that the regulation of *ingenium* is the regulation of the power to form and change images. More precisely: the 'knowing power' is called *ingenium* in the proper sense 'when it at times forms new ideas in the organ of imagination, at times attends to those already made'.<sup>20</sup> A paragraph later, he identifies imagination as the central faculty through which intellect must work in order to attend to sensation and memory. If the intellect is examining something that 'can be referred to body, its idea must be formed in the imagination as distinctly as can be', and to make this all the easier it should be 'exhibited to the external senses' as well. Part II of the *Regulae*, Rules 13–24, proceeds to explain how to use imaginable figuration in the solution of all problems capable of being imagined. The kind of figuration used can be chosen for the sake of convenience, as long as it contributes to the clear representation of the elements of the problem and their relations to one another. It is no accident that in Part II he also begins to correlate geometrical figures with algebraic expressions by means of symbolic designation of what is orderable and measurable in the problem; this is the imaginative path to analytic geometry. The point, in the context of the *Regulae*, is less that Descartes is mathematizing thought, by our modern understanding of the term, and more that he is trying to expand the ways in which imagination's capabilities and the proportions borne by images can be accurately accessed, applied, and exploited.

In Rule 3, Descartes argues that intuition and deduction are the only two 'actions of the intellect' that allow us to arrive at 'the knowledge of things without any fear of deception'.<sup>21</sup> Intuition is the most basic; it is the simplest kind of knowing and allows everyone to intuit myriad things with the rational soul (*animus*). He lists a few of those things: that one exists; that one is thinking (as one thinks); that a triangle (that one is intuiting) is bounded by exactly three lines, and a sphere by a single surface. In Rule 9 he explains that intuition is concerned not only with mathematical matters but also involved in the acute sense perception of an expert craftsman who is able to focus on all the particulars of, say, a machine, and how these particulars are interconnected.<sup>22</sup> That relational capacity is *deduction*, which conjoins intuitions in chains that offer lengthier but still perspicuous surveys of what can be understood. One can see by intuition that wheel A in a mechanical watch drives wheel B; that wheel B drives wheel C; that wheel C drives cog D, etc. It is by an act of deduction, the

20 Descartes R., *Oeuvres complètes* vol. 10, 416.

21 Descartes R., *Oeuvres complètes* vol. 10, 368.

22 Descartes R., *Oeuvres complètes* vol. 10, 401.

step-by-step assemblage of all these intuitions, that the watchmaker can then conclude that the motion of wheel A tightens spring S.

As explained in Rule 6, which ‘contains the whole secret of the art’ of the method, the systematic way of preparing for the most sophisticated kind of cognition is to take whatever one encounters in one’s experience and to consider the degree to which it contains or participates in simple natures.<sup>23</sup> The examples Rule 6 provides that can be solved this way are problems of mathematical proportion, but once again this does not mean that Descartes ontologically ‘reduces’ everything to mathematics. Rather, the solution of problems requires that we understand the relations of things to one another as exactly as possible, whatever those relations might be. Proportional relations provide us simple and very understandable examples and models of this. If we want to find an arithmetic mean between two quantities, there is a simple way to calculate the answer: add the two quantities and divide by two. If we want, on the other hand, to know the geometric mean between two quantities, we must multiply them and take the square root—a more difficult problem, because it requires a more complex geometrical solution, or the equivalent algebraic solution of an equation in the second degree (that is, having a term of the form  $ax^2$ ; solving for the arithmetic mean requires only linear terms, with highest degree expressed in the form  $ax$ ). An even more complicated task is to start with two quantities (such as 3 and 81) and to determine two other quantities,  $x$  and  $y$ , such that  $3/x = x/y$  and  $x/y = y/81$  (the unique solution is  $x = 9$  and  $y = 27$ ). This problem can be solved by guessing, but Descartes was interested in the general method, and that requires solving a cubic equation (with a term of the form  $ax^3$ ). If instead we were asked to provide three geometrical means between two given numbers (for example, three numbers between 3 and 243 such that  $3/x = x/y = y/z = z/243$ ), the problem turns out to be easier rather than harder, because the proportional relations allow us to reduce a fourth-degree equation (highest term  $ax^4$ ) to two problems involving only the square or second degree.

One ends up with such relational enumerations of things by asking questions such as these (my examples): how much blue does the colour I am looking at now have compared to the one I looked at yesterday? How much power does the engine I am building produce compared to others? How does this power depend on the length of the cylinder or the area of the head of the piston? Rule 6 of the *Regulae* says that for everything we encounter, we need to place it with respect to other things according to degrees of similarity and dissimilarity.

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23 Descartes R., *Oeuvres complètes* vol. 10, 381.

The latter can be sequenced either by approximate order (most, second most, third most, etc.) or, if there is a determinate unit we can apply, by measuring in terms of that unit (wavelength, joules, millimeters). Where things do not allow for direct comparison, we might be able to find an intermediate quality or characteristic (a nature) that mediates the two. For instance, if we were trying to gauge political influence, it might be useful to know how many friends A has versus B, but we would also need to know more about characteristics of those friendships and perhaps also how many different friends and kinds of friends those immediate friends have. For obvious reasons, Descartes was most interested for the sake of presentation in problems that lent themselves to the most exact solutions—perfect problems, as he called them—but the method applies, if less accurately, to problems of all kinds (which were to be taken up in Part III of the *Regulae*). An analysis of a problem in terms of its elements and elemental relations would be of use even if the givens did not allow for a necessary solution, not least because the analysis can point to other things and natures we need to know.

### Between Aristotle and the Mature Cartesianism

We know that Descartes was schooled in an early modern variant of Aristotelian-scholastic psychological theory of the kind we have considered, given the general intellectual culture of his day and, more particularly, the curriculum specified for the Jesuit college he attended for nearly eight years in his youth, the Collège Henri IV at La Flèche. It is speculation, to be sure, but not misleading in principle to claim that Descartes would therefore have recognised that the images of sense and imagination were based on some type of proportion between powers of human apprehension and their corresponding objects. It is not surprising that his early notes and writings show a constant interest in proportionality and images. But his interest in the 'dynamics' of proportional relationships achievable by conceiving rigidly determined motions of images and figures with respect to one another went beyond his textbooks.

Does this interest and approach make Descartes some kind of Aristotelian? Only if we are satisfied with an answer such as, 'yes, of a very peculiar kind'. He took key contentions of Aristotle and Aristotelians very seriously, above all their anatomy of the apprehensive and cognitive soul powers and their claim about the centrality of images to knowing. He thought about these things with the radicality characteristic of thinkers who deserve the appellation 'great'. There are those who think Descartes's early approach was not radical

enough. Jean-Luc Marion, for example, has characterised the undertaking of the *Regulae* as a kind of 'grey ontology'.<sup>24</sup> That is, the simple natures in which things participated according to proportion were surrogates for the natures and forms of Aristotelian metaphysics—surrogates that Descartes did not fully think through at the time he composed the *Regulae*. Even though Marion does not address imagination in detail in *L'Ontologie grise*, his conception of the grey ontology of the *Regulae* allows us to formulate more accurately what happened to Descartes's philosophy of imagination in later writings. Descartes's metaphysical dualism of *res cogitans* vs. *res extensa* is only foreshadowed in the writings of the early period. The strict dualism is a later development of the problem of simple natures.

In the *Regulae*, Descartes never calls for a reduction of problems to the single nature *extension*. The ordering and measurement he expressed in terms of geometry and algebra were not meant to show the ultimate nature of things as mathematical or extensional, but only to serve as a simplified representation of the interrelationships of things and natures insofar as they involved proportionality. For example, the triangles he uses in his notebooks to express relations of speed, time elapsed, and distance traveled of a falling body do not directly mirror physical characteristics of the event. Rather, the lengths of the triangle's sides and the areas that can be calculated from them are representations of the proportions between the elements the problem-solution depends upon. He expressly allowed that natures useful for solving a problem might not fully correspond to natures in physical reality (in particular in Rule 12 of the *Regulae*).<sup>25</sup>

The use of imagination and even geometrical and algebraic representation in the *Regulae* did not purport to represent in any direct way the actual physical character of the object under investigation, much less its physical position or motion.<sup>26</sup> In that sense the representations were notional and virtual. What the imaginative representations did for the knower, however, was to provide greater stability and amplitude in her knowledge of things and their relations. The appeal to simple acts of intuition, which could in turn be joined in deductive sequences, was in effect a critique of the medieval (and Aristotelian) search for explanations by identifying 'middle terms' between the beginning point and the ending point of reasoning. According to middle terms, the fact that any ancient Athenian you come across is going to die is mediated by

24 Marion J.-L., *Sur l'ontologie grise de Descartes: Science cartésienne et savoir aristotélicien dans les 'Regulae'* (Paris: 1975).

25 Descartes R., *Oeuvres complètes* vol. 10, 418.

26 See especially Descartes R., *Oeuvres complètes* vol. 10, 448–449.



the fact that he is a human being and that human beings are mortal. In the *Regulae* Descartes complains that arranging terms in syllogistic form is good only for summarising what is already known. Insofar as actual inquiry was concerned, the "method" is random, a wandering about in the hope that one might stumble across a helpful middle term. In its place he recommended a different method, one that he carried through to the *Discourse on Method* (1637): start with a clear expression of what the givens of a problem are; divide the problem into parts, maybe even into its fundamentally simplest parts; compare the elements arrived at through analysis to one another and give expression to the relations you find in simple images and formulas; then gradually try to recompose the simpler parts into wholes that reconstruct and re-express the givens so that a solution can be determined. This technique allowed for the movement of thought, step by step. Each re-expression of the elements of the problem could lead to new intuitions and deductions, and if one could not be sure in advance that any given step approached a solution, at least each step further elucidated relationships that eventually might contribute to one. Each step taken stabilised the problem by making its bases and implications more certain, and through the movement in thought driven by intuitions and deductions the inquiry led to an amplification of understanding.

Beginning around 1630, as reflected in essays unpublished in his lifetime (*The World and Man*) as well as those published in his *Discourse on Method*, Descartes turned to the direct imaginative representation of things and their motions. This brings us closer to the kind of 'mathematisation of thought' that we have come to associate with Descartes. These direct representations are ever more strictly geometrical and algebraic and, he came to argue, correspond to the actual being and motion of things. A physical thing consists quite literally of all its component material parts, and those parts can be divided and analysed into their material subcomponents, all the way down to whatever the ultimate components might be. Moreover, the motion of those components is governed by invariant rules of motion. Each particle that moves does so because it is subject at a given moment to many different straight line forces and tendencies of force. Each of these forces and tendencies could be represented as stronger or weaker linear impulses that, along with every other one, lead to the resultant motion of the particle.

This stricter approach to imagining yields problems in two- or three-dimensional dynamic geometry that are direct images of a real situation. One can devise in an imagined Cartesian space an imaginative representation of all the forces and tendencies, and all the actual particle motions. For any single material point the result would be a curved path that the corresponding particle should actually follow, given those forces. In turn, the path can

be expressed, using ever more sophisticated versions of the correlation of geometry and algebra that he had been working on since the *Regulae*, in algebraic equations that can be manipulated to work out the dynamic evolution of the physical event. Nevertheless, this does not imply that every use of geometrical and algebraic representation has to be a direct figuration of a physical situation. It is possible, for example, to use these more powerful techniques to solve purely geometric and algebraic problems, and these solutions could be used to represent indirectly ever-more-complicated relations in ever-more-sophisticated problems.

In the *Regulae* the new techniques of dynamic mathematical representation had been called on to image a real thing or situation as much or as little as one wished. Achieving a solution as conveniently as possible was the goal. One might do this by identifying proportions at whatever level allowed for a solution, without having to probe how proportions at a more 'microscopic' level might produce them. In the later work, the accuracy in principle of the detail of the imaginative representation becomes primary. Descartes's titling one of those later works 'the world' (*Le monde*, written 1630–1633) suggests that the investigator aimed to make a dynamic image of the whole world. It is no accident that the crucial turn to this project occurs in section vi of the work, as Descartes advises us to move our gaze away from the situation of the real world toward the 'imaginary spaces' that exist beyond it, to construct a world there of simple, divisible matter subject to simple forces tending along straight lines, and then to follow out the motions and combinations of imaginative matter that take place there.<sup>27</sup> What we discover, Descartes claims, is that this world constructed by imagination under the guidance of reason is a three-dimensional imaginative model of the real world we occupy. Descartes's science is thus the result of intelligibly imaging the totality of the real world and its motions. Scientific understanding is an imaginary construction that imaginatively models the real. Mathematics and scientific understanding are in this view the most rigorous form of imagining and modeling the real ever conceived.

This conception of Descartes's mathematisation of reason, far more radical than the usual one presented, throws obstacles in the path of simplistically countering the rationalisation of the world by a romanticising apotheosis of creative imagination. Descartes's science is itself an apotheosis of inventive imagination. It started with the conceptual topology of imagination he inherited from antiquity by way of the Middle Ages, which he put in action by making imagination intrinsically mobile. Those were radical developments, rather

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27 Descartes, *Oeuvres complètes* vol. 11, 31–32.

than contradictions or repudiations, of the role of images in the act of knowing that was at the heart of the Aristotelian conceptual topology. This does not mean that they were strictly logical consequences of it, however, nor that they were the only possible method to develop anew the old topology. Yet, as shown earlier, Aristotle himself had given at least a few indications of a deeper level of imagining in deliberation where the mobility of thought was crucial. In fact, his medieval interpreters worked out a sophisticated theory of interactive internal senses that produce and work on phantasms, 'preparing them' for the act of intellectual abstraction. For Descartes, intellect was even more deeply, constantly, and directly involved in the phantasmal work than they had conceived. Except for a few critical moments of philosophical reflection—such as the intuition of one's own being as a thinking self, and the recognition that the total cause of such a self had to be an infinitely perfect being—intellect worked with and on images.

### Imagining beyond Mathematics to the Human Good

Much more could be said about imagination in Descartes, especially in his later writings.<sup>28</sup> Here, in conclusion, I offer a handful of remarks. In a letter of 15 April 1630 to Marin Mersenne, Descartes first presented his theory of mathematical truths or, as Mersenne and later scholars preferred to call it, created eternal truths.<sup>29</sup> The theory is simple: the fundamental laws that govern all the creatures in the universe are themselves creatures, and that means they might have been created different. These created laws are the foundation both of physical reality and of our ability to conceive and think about physical reality. The universe might have been quite different, had God willed it so—even the principle of noncontradiction as we know it might not have had a place in such a creation.

This theory bears an important connection to imagination, though Descartes does not point it out himself. In his mathematical writings of the period, Descartes attempted to use indefinitely expanding algebraic representations to express iterated geometrical transformations that approach a finite limit: thus imagining was capable of a certain kind of limitlessness, even if that did not quite amount to true infinity. As always, he understood the activity of imagining, as opposed to simply having an image to gape at in the organ

28 As background for this section, I refer the reader to Sepper D.L., *Descartes's Imagination: Proportion, Images, and the Activity of Thought* (Berkeley – Los Angeles: 1996), ch. 7.

29 Descartes, *Oeuvres complètes* vol. 1, 143–146.

of imagination, to be the activity of the intellect in that organ. If the *Regulae* vastly expanded the relevance and use of imagination in solving problems of all types, it shied away from addressing directly the question of what it cannot do. When he turned to metaphysics during his 1628–29 sojourn in Holland, he appears to have discovered a great deal more about that which only intellect can achieve—in particular, the comprehension of the true infinity of (the idea of) God. One reason that the role of the imagination in Descartes's philosophy has been underestimated is that he made this discovery before he published anything, about the imagination or anything else. When he expressly addresses the imagination in the published writings (which began to appear only in 1637), he tends to focus on the simple case of having a single impression in the pineal gland and the intellect passively perceiving it, rather than treating the dynamic manipulation and processing of images and their proportional relations for the sake of ever-increasing knowledge of the world.<sup>30</sup>

Descartes did not thereby repudiate the imagination or its usefulness in mathematics and the sciences, however. Quite the contrary: the later metaphysics simply puts the imagination in its place, subordinated to the recognition of one's thinking-being and of the existence of the infinite God. A largely unnoticed effect of the doctrine of created mathematical truths is that it establishes not only the unending space of the universe but also the limitless space of the imagination. Imagination's space is isomorphic to real space. If the processes of the imagination are regulated by the intellect's insights into God's ordinance of extension, then it can produce a dynamic image of the real universe. If the imagination is too limited ever to present to itself the entirety of space as God has ordered it, it can nevertheless represent and track parts of it in a way that corresponds to reality, it can move from part to part at will, and it can present to itself as much as it needs in order to address any scientific problem. If, for instance, the intellect's grasp of the significance of indefinite linear movement is applied to any part of imagined space, that part and that motion can be indefinitely extended in the imagination in accordance with the mathematical truths by which God has established real space.

The *Meditations* is the principal work in which Descartes exhibits the limits of the imagination. It is also a work in which the imaginative techniques he employs are often not mathematical at all. It is not just that he deploys images and figures like the metaphor of building on sand versus building on clay or rock. He also invokes dream fantasy and uses such figures as the madman

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30 For an extended discussion of the context and rhetoric implied by Descartes's various presentations of the imagination, see Saunders B.J., "Descartes's Divided Imagination and its Legacy in Kant and Hegel", Ph.D. dissertation (University of Dallas: 2012).

with a head supposedly made of glass. Even more important, however, is that the meditations follow the essential structure of medieval meditational practice and theory, moving through the senses and the internal senses (including imagination and memory) to intellect (and will). Descartes's meditator observes that when all the phantasms he has experienced are detached from the postulate of reality, they are insufficient to establish any reality at all—except for the fact that all their differences and similarities and their amplitude and scope still require some point of focus (the thinking self that thinks them all) and a cause for that focusing self (God). The imagination, it is true, is not equal to the task of recognising infinity. But the intellect cannot apprehend the infinity of the positively infinite until it first has thought the world of phantasms through to an ever-receding limit beyond which phantasms cannot go. In that sense, the imagination may not be a direct aid to the intellect's apprehension of self and infinity, but it is an essential indirect aid. Without the imagination, there is neither proof of the cogito nor proof of God's existence, since they can be recognised only in contrast to the theoretically limitless but practically finite scope of human imagining.

Descartes did not have any interest in the magical or demonic imagination. Even some of the old questions of traditional imagination theory, such as how the appearance of a child can be transformed by its mother having seen a picture of the pope or a Moor, only caught his attention in passing. Perhaps, to his mind, God's constant lordship over the physical world through the created mathematical truths rendered any magical or even demonic or angelic effects moot. Given the real distinction between extension and thinking, the human being's control of his or her own body and the effects that that body could exert on the surrounding world were miracle enough for him.

Still, in the last work he published in his lifetime, *The Passions of the Soul* (1649), the imagination began to take on a new role. Even if it could be guided by intellectual perception, that fact was now subordinated to another: that the imagination was first and foremost an act of the will.<sup>31</sup> Moreover, the formation of representations and images was conceived as an effect in the entire system of hollow nerves filled with animal spirits that extended throughout the body, which had its command center in the middle of the brain, in the pineal gland. Whether these were genuinely new developments or merely consequences of earlier but unpublished thinking, the imagination as a function of will under the guidance of intellectual perception opened up a philosophical front that

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31 Descartes in the *Passions* speaks of perception rather than intellect, and argues that thought is more properly the corresponding act of will than it is the passive, derivative perception that accompanies it; see Descartes, *Oeuvres complètes* vol. 11, 342–344.

began to occupy the practical, ethical, and even political life of human beings. The imagination was at home in this animal spirit system, and imaginings typically had more effect on human psychophysiological states and well-being than did will or intellect by themselves. In order to live well, the imagination needed to be managed not so that passions might be suppressed, but so that they might produce 'all the sweetness of life'.<sup>32</sup>

Descartes died a few months after *The Passions* appeared. We cannot know what more he might have written, about imagination or anything else, if he had survived a few more years. We do know, however, that his last work was a ballet or masque, a combination of dance, song, and drama, written for Queen Christina of Sweden and her court. Was it an imaginative evocation of both the bitter and the sweet possibilities of a full human life? Some contemporary historians of theater think so. Its significance for understanding Descartes is disputed. It is hard for many philosophers to accept the idea of a philosopher-poet. Perhaps there was even more to Descartes than our historiography has hitherto imagined.<sup>33</sup>

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32 Descartes, *Oeuvres complètes* vol. 11, 488.

33 Controversies about the ballet commenced in earnest in the 1920s, when a copy of *La Naissance de la Paix* came to light. Among the most recent contributions are Watson R.A., *Descartes's Ballet: His Doctrine of the Will and His Political Philosophy* (South Bend, Indiana: 2007), which denies Descartes's authorship, and Gobert R.D., *The Mind-Body Stage: Passion and Interaction in the Cartesian Theater* (Stanford, California: 2013), which defends it.

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# Schematism, Imagination, and Pure Intuition in Kant

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## Introduction

In his *Critique of Pure Reason* (1st ed. 1781) Immanuel Kant (1724–1804) identified a significant difference between philosophy and mathematics: whereas philosophy proceeds discursively and is rooted in deductive reasoning, mathematics proceeds intuitively and is based on ‘pure intuition’. Mathematical insights belong to the ‘cognitio sensitiva’.<sup>1</sup> They constitute an *a priori* and synthetic form of ‘sensible knowledge’, as mathematics ‘cannot do anything with [...] mere concepts but hurries immediately to intuition, in which it considers the concept *in concreto*’.<sup>2</sup> Kant also calls this ‘construct[ing] a concept’ or ‘exhibit[ing] *a priori* the intuition corresponding to it’.<sup>3</sup> The idea that mathematics is rooted in intuition is irritating. On the one hand, since Euclid’s time, mathematics has

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- 1 This term was coined by Alexander Baumgarten, who redefined the epistemic sense of human sensitivity from the restricted concept of a deficient form of human cognition to an affirmative concept of productive cognition. Baumgarten Alexander Gottlieb, *Ästhetik*, trans. Dagmar M. (Hamburg: 2007) §1. Baumgarten thus founded the type of aesthetic reasoning. Yet for Kant the idea of ‘intuition’ and sensible reasoning do not refer to aesthetics but to a specific kind of rational reasoning.
  - 2 Kant Immanuel, *Critique of Pure Reason*, trans. P. Guyer – A.W. Wood (Cambridge: 1998) 631. Mathematics ‘kann mit dem bloßen Begriffe nichts ausrichten, sondern eilt sogleich zur Anschauung, in welcher sie den Begriff in concreto betrachtet [...]’ Kant Immanuel, *Kants gesammelte Schriften*, ed. Königlich Preußische Akademie der Wissenschaften (Berlin: 1928) vol. XX, A 716/ B 744.
  - 3 Ibid. 630. ‘Philosophical cognition is rational cognition from concepts, mathematical cognition that from the construction of concepts. But to construct a concept means to exhibit *a priori* the intuition corresponding to it. [...] The individual drawn figure is empirical, and nevertheless serves to express the concept without damage to its universality, for in the case of this empirical intuition we have taken account only of the action of constructing the concept’. ‘Die philosophische Erkenntnis ist die Vernunftkenntnis aus Begriffen, die mathematische aus der Konstruktion der Begriffe [...] Die einzelne hingezeichnete Figur ist empirisch und dient gleichwohl, den Begriff, unbeschadet seiner Allgemeinheit, auszudrücken, weil bei dieser empirischen Anschauung immer nur auf die Handlung der Konstruktion [...] gesehen wird’. Kant, *Gesammelte Schriften* XX, A 714/ B 742.



been considered the ideal rational science, whose theories can be axiomatically and deductively verified through the logically disciplined study of concepts. On the other hand, an intuition that is based on the senses but *not* empirical perception is counter-intuitive. Every empirical experience is singular and can only be inductively generalized for other cases. However, mathematical truths are considered necessary and universal: they cannot turn out differently. So how can intuition be immune to verification or falsification through experience? Is that not a paradox? It is no wonder that Kant's philosophy of mathematics is contradicted more often than almost any other part of his philosophy.<sup>4</sup> Philip Kitcher offers a prime example: 'Kant's theory was wrong from the beginning. His attempt at explaining mathematical knowledge gives no explanation at all'.<sup>5</sup>

The following reflections are intended to show that it is possible to reconstruct Kant's conception of mathematics from a perspective that is referred to here as the 'diagrammatological'. Its basic idea is that the *non-empirical form of intuition* proclaimed by Kant is a theoretical use and extension of a specific *practical form of figuration*. This practical form is based on a figurative or symbolic graphism that constitutes the typical representational medium and cognitive process of mathematics: when the geometrician draws or constructs and the arithmetician/algebraist arranges and rearranges numerals and letter symbols, spatial relations inform embodied non-spatial, non-sensible facts in the form of visually figurative or symbolic configurations. The practice of constructing a figure is certainly an empirical operation, as it results in a concrete drawing. However, the constructive normativity of this operation ensures that a non-empirical mathematical object is visualized through the empirical figure and made accessible through its haptic rearrangement. The empirical line of the geometrician, which—not unlike the brushstroke of a painter—actually has length *and* width, is considered a one-dimensional and therefore non-empirical line within the framework of the schematising mathematical practice of figuration. The line *embodies* a mathematical object even though it *is* not actually a mathematical object: it is impossible to draw a truly one-dimensional line. In the medium of figuration—and this is also why the concept of embodiment has been employed—the conceptual is not simply *represented* but rather *presented* in a sensible constellation. This connection between

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4 This critique falls into two camps: categorical rejection (Russell 1919, Einstein 1905, Carnap 1922, Schlick 1922, Reichenbach 1924, Helmholtz 1883) and historical legitimization in so far as Kant can be reconstructed by means of modern logic (Beck 1996, Hintikka 1992, Friedman 1994). There are also charitable interpretations from a pragmatic-phenomenological perspective (Barker 1992, Giaquinto 2007; Giaquinto 2008; Harper 1992, Melnick 1992).

5 Kitcher P., "Kant and the Foundations of Mathematics", *Philosophical Review* 74 (1975) 23–50. Reprinted in Posy C.J. (ed.), *Kant's Philosophy of Mathematics* (Dordrecht: 1992) here: 123.

figuration and cognition, which is implicitly inherent to Kant's thoughts on mathematics, should now be made explicit.<sup>6</sup> This explication is based on the analysis and integration of three epistemological aspects of Kant's work that have not yet been connected to each other. These are: (1) Kant's early discovery of directionality as the distinguishing feature of spatiality; (2) his discussion of incongruent counterparts and their intuitive foundation; and (3) the role of imagination and schematism.

### Directionality

In his last precritical text of 1768, "Concerning the Ultimate Ground of the Differentiation of Directions in Space", Kant communicated a discovery that was central to his work: the meaning of 'space' can be determined not solely—as Gottfried Wilhelm Leibniz (1646–1716) had still assumed—through the positions and positional relations of bodies; it must also incorporate their directionality.<sup>7</sup> Space is therefore not only the place that things occupy, but also their respective *direction* or orientation. Kant employs the term 'direction' to distinguish it from 'location'. But why is the idea of directionality as a distinguishing feature of space important to Kant?

Kant's original goal in this text was to develop an ontology of space, advocating Newton's absolute concept of space as opposed to Leibniz's relational concept of space. For Newton, space was a container that precedes and remains independent of the existence of the objects it contains, while for Leibniz space originated in the relations of bodies to one another.<sup>8</sup> Initially, Kant thought his discovery that space implies not only positionality but also directionality could support Newton's idea of absolute space. For Kant, this directionality initially appeared to suggest that bodies were embedded in a space that *precedes* them, following Newton's model, and that they were oriented within this absolute space. In addition to the intrinsic positional relations modeled by Leibniz, therefore, there is also an extrinsic relation of bodies to the 'absolute space of

6 Mathematics is not the sole domain where Kant uses figuration; compare his tables of judgements (Kant, *Gesammelte Schriften* xx, A 70/ B 95) and categories (Kant, *Gesammelte Schriften* xx, B 106/ A80) within his epistemology of reasoning.

7 Kant Immanuel, "Concerning the Ultimate Ground of the Differentiation of Directions in Space", in Walford D. – Meerbote R. (eds.), *The Cambridge Edition of the Works of Immanuel Kant: Theoretical Philosophy, 1755–1770* (Cambridge: 1992) 361–372.

8 Concerning the differences between Leibniz and Newton relating to natural philosophy, see: Leibniz Gottfried Wilhelm – Samuel Clarke, *Leibniz and Clarke: Correspondence* ed. R. Ariew (Indianapolis: 2000).

the universe'.<sup>9</sup> Nevertheless—and this is a crucial and perhaps also astonishing change for Kant—the human sensorium is incapable of grasping the alignment 'of the system of these positions to the absolute space'; people can only perceive something external when it bears a relation to their bodies.<sup>10</sup> His example is a page of writing: when it is turned 180 degrees, the internal relations between the positions of the letters remain the same, which is precisely what Leibniz considered to be the defining feature of spatiality; however—and this is Kant's point—the inverted page of writing becomes unreadable.<sup>11</sup> As a result, humans can only grasp the direction of perceived objects by relating them to the direction of their own bodies. Humans have a sense of directionality by virtue of their own bodily situatedness, which provides them with a basic matrix of orientation. They can distinguish between front and back, above and below, as well as right and left, which correspond to their three perpendicular body axes.

We see that in this last precritical text Kant still wanted to advocate an ontology of space that was consistent with Newton's concept of absolute space. Yet at the same time he was forced to concede that humans only acquire an infallible sense of this orientation in 'absolute space' by relating it to their own bodily 'local' direction. For Kant, therefore, spatiality was grounded in corporeal subjectivity, which is an astonishingly phenomenal (not to say phenomenological) formulation. What is most important about this quasi-phenomenal foundation is the idea that the sense of direction is embodied in human subjectivity, which implies that 'direction' cannot be *described* discursively but rather only *shown*. Kant applied the German concept of '*Gefühl*' in the sense of 'sensation' to the non-propositional character of directionality: we have a 'feeling' for the meaning of the difference between right and left, above and below, front and back, which is acquired through intuition and cannot therefore be formulated in the medium of language.<sup>12</sup> The difference between right and left cannot be definitively described verbally, but rather only *shown*. In order to

9 Kant, "Concerning the Ultimate Ground of the Differentiation of Directions in Space" 365.

10 Ibid.

11 Kant, "Concerning the Ultimate Ground of the Differentiation of Directions in Space" 367. 'For example, in the case of a page of writing [...] we look at the position of the letters from left to right, or from right to left. In this example, no matter how the page be turned, the position of the parts arranged on the surface of the page and taken in relation to each other is exactly the same, and the pattern which the arrangement of the parts presents is in all respects identical. But as we have presented the matter the difference of the directions is so important and so closely connected with the impression made by the visual object that the self-same writing, when viewed with everything transposed from right to left, ceases to be recognisable'.

12 Kant, "Concerning the Ultimate Ground of the Differentiation of Directions in Space" 365.

clarify this kind of phenomenal difference, the communicants must share the same intuitive space.

### Incongruent Counterparts

Kant uses so-called ‘incongruent counterparts’ (‘inkongruente Gegenstücke’) to demonstrate that spatial directionality is a phenomenon perceptible by the senses that cannot, however, be exhaustively described conceptually. Incongruent counterparts are objects or figures that are actually ‘exactly equal and similar to another’ yet cannot be converted into one another due to movements like shifting and turning—in other words, due to changes in their positions. With the help of incongruent counterparts Kant wants to make plausible that: (1) positional relations do not adequately define a space, and that their directionality must also be taken into account, and (2) this directionality can only be revealed through intuition, and cannot therefore be discursively conceptualised.<sup>13</sup>

Hands are a prime example of incongruent counterparts: we perceive that the right hand does not fit in the left glove because both hands are inversely oriented—despite the similarity in the internal relations of their constituent parts. When two objects that appear to be structurally similar are incongruent, then there is an inverse relationship between them: one is a mirror image of the other. To make this clear, consider the following examples:

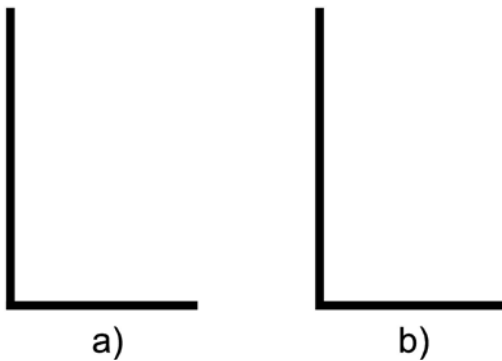


FIGURE 11.1 *Two Ls differentiated numerically: a) and b).*

<sup>13</sup> Ibid. 370.

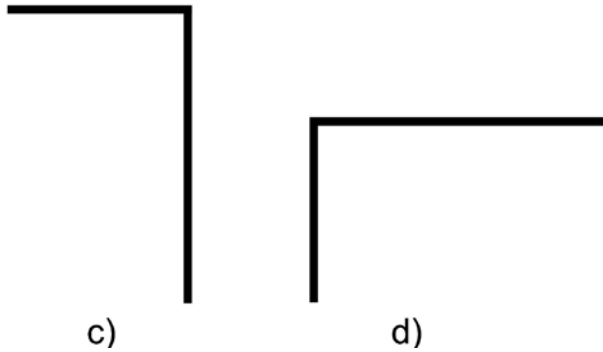


FIGURE 11.2 *The L is rotated and staggered in height: c) and d).*

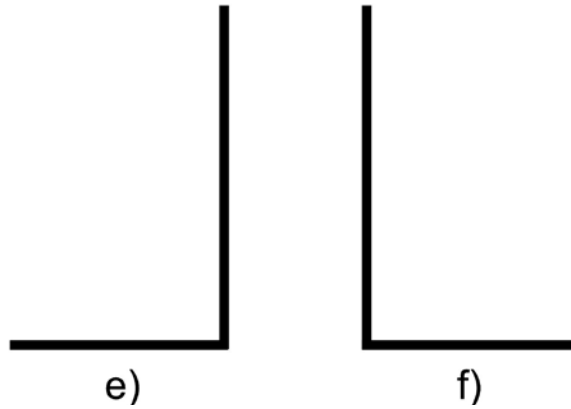


FIGURE 11.3 *Mirror-inverted L: e) and f).*

Figures a) and b) can be aligned through a parallel shift.

Although at first glance they may appear different, it becomes apparent that figures c) and d) can also be aligned by shifting and rotating them.

Despite the obvious congruence in the internal relations of the figure elements, they cannot be aligned on the plane by shifting and rotating. For Kant, therefore, they are ‘incongruent counterparts’.<sup>14</sup>

14 See: Earman J., “Kant. Incongruous Counterparts, and the Nature of Space and Space-Time”, *Ratio* 13 (1971) 1–18 (reprint: Van Cleve J. – Frederick R.E. (eds.), *The Philosophy of Right and Left* (Dordrecht: 1991) 131–150 and also Harper W., “Kant on Incongruent Counterparts”, in Van Cleve – Frederick, *The Philosophy of Right and Left* 263–314.

It is characteristic for many objects, such as human limbs, bean stalks, screws, corkscrews, and snail shells, to have a sense of direction. We know from using screws and corkscrews that it is important for many real life practices to take into account the direction of the rotation of objects. This also applies to objects of scientific research: physics, chemistry, and biochemistry often examine parity violations, in which the natural laws that apply to an object do not apply to its mirror image. However, Kant's discussion of incongruence must be qualified in two respects: (i) It is only impossible to align incongruent counterparts within their own dimension. Congruence can be produced in the next higher dimension. For example, the two-dimensional contour lines of two hands can be converted into each other if and only if it is possible to rotate them in the third dimension. And we know that the right hand will fit the left glove when it is turned inside out! More generally speaking, objects that are incongruent in the  $n$ -dimension can be made congruent in the  $(n+1)$ -dimension. (ii) The Moebius strip is a special form in which the phenomenon of incongruence never arises because it is impossible to discern directionality; it is an unoriented space. *Mathematically*, therefore, Kant's statement concerning the inconvertibility of incongruent counterparts is only partially true. However, his recourse to incongruence makes sense when considered from a 'local' human perspective, as it is not possible in real life to move freely to higher dimensional spaces or to live on Moebius strips.<sup>15</sup>

In his 1770 dissertation, Kant returned to the topic of incongruent counterparts, but no longer in order to prove the absoluteness of space, which had become for him an 'empty fabrication' and 'fable'.<sup>16</sup> Instead, incongruence now served to show that intuition is an independent epistemological faculty that can be distinguished from conceptual knowledge. Intuition is grounded in a 'form' that is no longer derived from objects, but is rooted in the 'nature of the subject' and the condition of its senses.<sup>17</sup> It is particularly significant in the context of this discussion that Kant characterized the form of intuition using concepts such as 'an outline' and 'any kind of schema', thereby emphasizing that its form is not dependent on objects but rather on the condition of the intuitive faculty.<sup>18</sup> The form thus becomes an outline of the constitution of human sensibility.

15 See: Earman, "Kant. Incongruous Counterparts, and the Nature of Space and Space-Time".

16 Kant Immanuel, "On the Form and Principles of the Sensible and the Intelligible World", in Walford D. – Meerbote R. (eds.), *The Cambridge Edition of the Works of Immanuel Kant: Theoretical Philosophy, 1755–1770* (Cambridge: 1992) 373–416, here: 397.

17 Ibid. 385.

18 Ibid.

Intuitive thought refers to an individual perceptible phenomenon, while conceptual thought refers to something universal that applies to many phenomena, which Kant calls ‘experience’.<sup>19</sup> Space thus becomes the basic form of all phenomena, from which we acquire experience: space evolves into a form of ‘pure’ or ‘*a priori*’ intuition. It is precisely this sense-bound and yet *a priori* form of spatiality that—for Kant—is the subject of Euclidean geometry. But how can geometry derive the notion that the shortest distance between two points is a straight line through the intuition of an individual drawing if this insight must apply to any pair of points? And how is this accomplished despite the fact that geometry—according to Kant—achieves this insight *not* within the framework of the axiomatic and deductive study of concepts but rather ‘intuitively’? In order to understand this peculiar intersection between the perception of the individual and the conception of the essential and the general, it is necessary to return to Kant’s discussion of ‘schema’ and its connection to intuition.

### Schematism

The short chapter in the *Critique of Pure Reason* “On the Schematism of the Pure Concepts of Understanding” is challenging, but was characterized by Kant in a hand-written note as ‘one of the most important’.<sup>20</sup> For an understanding of the figurative move and the role of imagination in Kantian epistemology, his discussion of schematism is central. In everyday life, we associate a schema with a concrete structural image, such as the organization chart of a business enterprise or the architectural plan of a building. Kant, however, made a strict distinction between schemas and images: images can be the products of schematisation, but schemas are not images. Rather, schemas are the condition of the possibility of producing images, which then enable the acquisition of epistemic experiences. But what does this mean?

Remember that Kant considered intuition, which aims at the particular, and conception, which aims at the general, as two independent sources of knowledge. In light of the heterogeneity of these two modes of thinking, how is it even possible to relate objective concepts to subjective intuitions in order to produce concrete knowledge of the experience of reality? Kant’s chapter on

19 Ibid. 386.

20 Kant, *Critique of Pure Reason* 728, n51; also cited in Heidegger M., *Kant and the Problem of Metaphysics*, trans. R. Taft (Bloomington: 1997) 80.

transcendental deduction shows us *that* concepts can be applied to objects of experience.<sup>21</sup> His chapter on schematism shows *how* this is possible.<sup>22</sup>

Kant's basic idea is that the heterogeneity of intuition and conception can be bridged when a mediator or intermediary combines the qualities of *both* sides in its role as a 'third'; 'this mediating representation must be [...] *intellectual* on the one hand and *sensible* on the other'.<sup>23</sup> Kant calls this third thing between intuition and conception a '*transcendental schema*'.<sup>24</sup> It stands to reason to identify the fundamental role of the schema with the sensible, visible signs—be it figures or symbols—during the process of cognition, as Leibniz had worked out in his "Ars characteristica." For Leibniz, the perceptible sign functions as an operative substitute for the imperceptible object of cognition and, put simply, Leibniz sees this '*blind* or *symbolic*' cognition as constitutive of the human condition, which is strictly opposed to the intuitive cognition that Leibniz reserves for God.<sup>25</sup> Leibniz's 'symbolic cognition' constitutes a form of 'ars analytica'. Kant's theory of schematism is therefore not a newer version of Leibniz's theory of symbol-mediated cognition, on account of the *intuitive* and at the same time *synthetic* character of Kant's schematism. It is here that imagination comes into play.

The schema is 'a product of the imagination'.<sup>26</sup> The task of the imagination is to provide a concept with an image and thus to join something that has no perceptible components to its corresponding intuition. Kant refers to this regulative process as 'figurative' or 'intellectual synthesis'.<sup>27</sup> The synthetic function of the imagination and thus the mode of schematisation differs in accordance with the three kinds of concepts that Kant distinguishes: (i) empirical concepts, (ii) mathematical concepts, and (iii) concepts or categories of pure reason.

- (i) Empirical concepts: An empirical concept such as, for example, 'dog' is the simplest case. The schema in question is the general form of a dog (four legs, fur, tail, etc.), which is common to all concrete dogs, and thus

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21 Kant, *Critique of Pure Reason* 219–266.

22 Ibid. 271–277.

23 Ibid. 272.

24 Ibid.

25 Leibniz Gottfried Wilhelm, "Meditations on Knowledge, Truth, and Ideas", *Philosophical Papers and Letters*, trans. L.E. Loemker (Dordrecht: 1989) 291–295, here: 292.

26 Kant, *Critique of Pure Reason* 273.

27 Ibid. 257.



constitutes a list of prototypical features. In reality, however, there is no such thing as a 'universal dog'. Having a schema for an empirical concept thus only means being able to identify individual things—such as real dogs—as *examples* of a concept. Schemas of empirical concepts make it possible to visualize general concepts through exemplification in real sensory impressions. It is important here to emphasize the processual nature or *active aspect* of schematisation: we *convert* a sensible object into the example of a concept by transforming something particular into the example of something general.

- (ii) Mathematical concepts: This active aspect is also evident in the case of mathematical concepts. Kant discusses the triangle, for example, as a mathematical concept that also serves as a rule of construction.<sup>28</sup> There is no singular image of a universal triangle. However, by understanding figurative synthesis as a *rule* for the construction of triangles, we produce particular images, which however in practice fail to achieve the degree of universality of the concept of a 'triangle'. Yet this rule of construction can be repeatedly used to produce a variety of triangle images that instantiate the same schema. The universality of schematism is thus made possible by the iterability of rule-governed construction. The non-empirical character of geometrical drawings is grounded in this process: "For the construction of a concept, therefore, a *non-empirical* intuition is required, which consequently, as intuition, is an *individual* object, but that must nevertheless, as the construction of a concept (of a general representation), express in the representation universal validity for all possible intuitions that belong under the same concept".<sup>29</sup> Unlike an empirical concept, therefore, the mathematical concept of the triangle is not formed by extrapolating a model of the triangle and its prototypical features from experience; rather, a graphic construction is realized by following rules that distinguish between the qualities that constitute the figure (for example, two of the three sides form an angle) and the attributes that are irrelevant (for example, the lengths of the sides). In this context, the intuition of every drawing of a geometrical object is a process that

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28 Ibid. 273. "No image of a triangle would ever be adequate to the concept of it. For it would not attain the generality of the concept, which makes this valid for all triangles, right or acute, etc. [...] The schema of the triangle [...] signifies a rule of the synthesis of the imagination with regard to pure shapes in space".

29 Ibid. 630.

involves *looking* at its essential qualities and at the same time *ignoring* its arbitrary attributes.

- (iii) Concepts of pure reason: These are concepts that can never correspond to any intuition, and are expressed in categories such as 'quantity', 'quality', 'relation', and 'modality', which Kant arranged in tabular form and which constitute the structural framework for everything that can be experienced.<sup>30</sup> These categories reveal once again the dynamic, processual aspect of schematisation. This can be demonstrated clearly by using the example of 'quantity', which is the topmost category in Kant's table. For Kant, the pure schema of quantity is numbers. Kant emphasizes that numbers can be represented in many different ways, such as a series of points or strokes or by means of fingers or the beads of an abacus.<sup>31</sup> What is constant in all of these various representations of numbers is the activity of stringing together homogeneous units. The operation of sequencing thus becomes the basis of numbers and counting, and is thereby—and this is Kant's point—the 'generation (synthesis) of time itself'.<sup>32</sup> It is therefore not simply numbers but rather time itself that is performatively generated through the implementation of sequencing: the *number* series is the *time* series; the generation of the structure of quantity is the construction of time itself. The schematism of categories leads Kant to temporality as the elemental link between the subjectivity of human cognition and the objectivity of the world of appearances.<sup>33</sup> In short, temporality constitutes the 'mother soil' of schematisation.

### Imagination

All three modalities of schematisation thus show that for Kant the schema is not a singular structural model, but rather an operational rule—whether iterative *exemplification*, as in the case of empirical concepts, or the iterative *production* of a variety of structural models, as in the case of mathematical concepts and the categories of pure reason. The power of schematisation lies in its capacity to distinguish between essential and contingent attributes in the epistemic use of figurative or intellectual synthesis. As mentioned

30 Ibid. 206.

31 Ibid. 341.

32 Ibid. 275.

33 See: Shabel L., "Reflections on Kant's Concept (and Intuition) of Space", *Studies in History and Philosophy of Science* 34, 1 (2003) 45–57.

earlier, Kant characterized the schema as a product of 'the imagination' or '*Einbildungskraft*'.<sup>34</sup> The root of the German word '*Einbildung*' and of the English word 'imagination' is 'image' or '*Bild*'. For Kant, the schema is not an individual image; nevertheless, the work of imagination is related to the temporal and dynamic power of visualization. 'Visualisation' should be understood here in the sense of figuration, which is not merely the object of sight but rather of *intuition*. This distinction is important, as it is the basis of Kant's idea of a 'non-empirical' or 'pure intuition'. In order to reconstruct this idea, the first step is to differentiate between seeing an image and seeing any other object. When seeing an image we typically do not perceive 'something as something', as is the case in everyday forms of visual identification; rather, we see '*something in something*', since what is shown *in* the image is typically seen without actually being present. We see an apple *in* the colors and forms on the canvas, yet at the same time it is clear that it is not a real apple; it is only in the context of this difference that it is possible to speak of 'seeing an image' rather than an optical illusion.

However, within schematisation, this characteristic of 'seeing-in', which applies to all images, is subject to a crucial metamorphosis, which sets it apart from the normal form of seeing an image. The point here is that visualisation in the realm of schematism is to be considered not as 'seeing', but as 'intuition'. In the geometrical drawing of a triangle, for example, we do not actually see a triangle, which in reality is absent; rather, we see in the empirical triangle a non-existent universal triangle, and we use the drawing mathematically in precisely this sense. The singular triangle *presents* rather than *represents* the mathematical triangle, as it is considered the embodiment of the universal triangle. By virtue of this presence, it is possible to see something conceptual *in* the individual. Kant refers to this form of seeing as 'intuition'. In contrast to perception, intuition grants evidentiary experience to the conceptual. Schematisation thus mediates between intuition and conception. In so far as schematisation is related to imagination, it is also possible to say that the mediation of seeing and thinking immanent in mathematical practices depends on the activity of the imagination. At this point, a conclusion immediately suggests itself: schematisation is a cognitive or mental act. In Kant's interpretation, however, this mental orientation is by no means conclusive.

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34 Kant, *Critique of Pure Reason* 273.

## Lines

The line constitutes the basic configuration of figurative synthesis and its corresponding 'pure intuition'. Kant emphasizes that the line depends not on visual, spatial physiognomy, but rather on the act of plotting the course of the line: 'I cannot represent to myself any line, no matter how small it may be, without drawing it in thought, i.e., successively generating all its parts from one point, and thereby first sketching this intuition'.<sup>35</sup> Here, Kant underscores the temporal, dynamic character of this synthesis, thus emphasizing its gestural nature; yet at the same time he characterizes this process as a mental operation that is performed in the inner world of thoughts.

This purely mentalistic interpretation is contradicted by the fact that for Kant, these mental processes in the inner world must be anchored in real processes in the outer world. This follows from Kant's discussion of space and time. Kant usually associates time with inner sense and space with outer sense. He emphasizes that '*drawing* a straight line' can be regarded as 'the external figurative representation of time'.<sup>36</sup> The course of the line becomes externalised, spatialised time. And this externalisation of the inner sense of time is necessary: as soon as time is understood not simply as movement but rather as *change*, it can only be conceived as an 'alteration in space' and thus as an 'outer intuition': '[W]e must be able to grasp time, as the form of inner sense, figuratively through a line, and grasp the inner alteration through the drawing of this line (motion) [...] through outer intuition'.<sup>37</sup> The exteriority of the course of the line is essential in order to produce a 'representation' of time because the perception of a change presupposes something permanent, yet 'there is no persistent intuition to be found in inner sense'.<sup>38</sup> Therefore, this permanence can by no means be an '*intuition in me*';<sup>39</sup> rather, it requires a spatial extension as part of the outer world. In other words, it requires the practice of figuration.

Kant repeatedly referred to the schema as a 'monogram'.<sup>40</sup> But may Kant's 'monogram' be interpreted as a precursor to the concept of a 'diagram'? Can Kant's idea of schematisation be interpreted as a contribution to an

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35 Ibid. 287.

36 Ibid. 258.

37 Ibid. 336.

38 Ibid.

39 Ibid. 121.

40 Ibid. 274, 552.

epistemological reflection of the diagrammatic—a ‘diagrammatology’ *avant la lettre*? This brings us back to the opening question of this essay: following Kant, how is it possible to understand and justify the epistemic practice of figuration in so far as it provides a reason for why mathematics is a form of intuitive rather than conceptual-discursive cognition?

### Euclidicity

Kant explained the difference between discursive philosophical cognition and intuitive mathematical cognition through the following example: a philosopher cannot solve the geometrical problem of ‘the relationship between the sum of the angles of a triangle and two right angles’ through an analysis of the concept ‘triangle’ (three straight lines, three enclosed angles, etc.). ‘Now he may reflect on this concept as long as he wants, yet he will never produce anything new’.<sup>41</sup> Unlike the philosopher, the geometrician *constructs* rather than *dissects* the concept of the triangle. This ‘construction’ consists in producing ‘*a priori* the intuition corresponding to it’.<sup>42</sup> Using this intuitive conceptual drawing the geometrician is able to determine that the sum of the angles of the triangle is equivalent to two right angles.

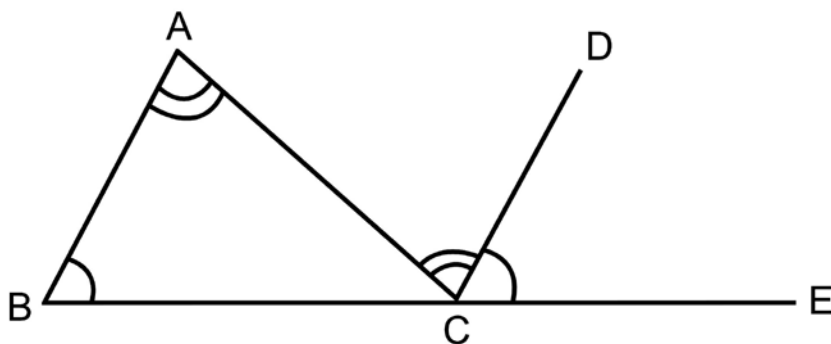


FIGURE 11.4 Kant's proof of the geometrician's procedure.

<sup>41</sup> Ibid. 631f.

<sup>42</sup> Ibid. 630.

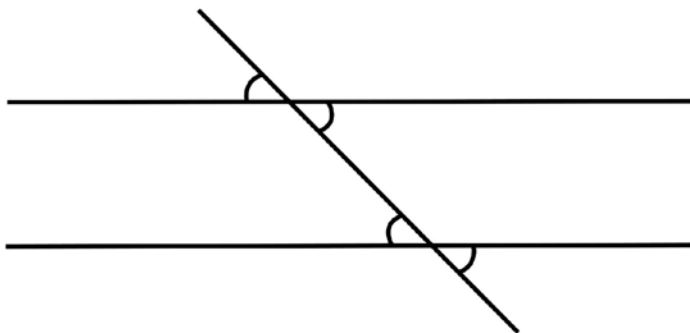


FIGURE 11.5 *Euclid's proof of theorem 29.*

Kant's description of knowledge acquisition through intuition is closely connected to Euclid's geometric operations. As early as 1962, Jaakko Hintikka accurately reconstructed Kant's Euclidicity with regard to the role played by drawings as geometric sources of knowledge. He showed that Euclid's geometric operation of *ecthesis*—which is used in the case of visual proofs—corresponds to Kant's practice of *construction*.<sup>43</sup> Euclid had demonstrated that the sum of the angles of a triangle is equivalent to two right angles by drawing not only a triangle but also two additional lines, which visually show that when a straight line intersects two parallel lines, the angles at the opposing points of intersection are equal. It is this insight, which is gained through intuition, which in turn renders it topologically clear that the sum of the angles of a triangle is equivalent to two right angles.<sup>44</sup>

Philip Catton and Clemency Montelle's reconstruction of Euclid's twentieth theorem, published in 2012, emphasizes the practical-synthetic character of Euclidean geometry by showing how its results are obtained from manual operations with concrete drawings. Geometric objects are not simply things, but rather 'forms for action'.<sup>45</sup> Catton and Montelle argue that diagrams appear in two different ways in Euclidean geometry. On the one hand, the diagrams that appear as idealised drawings are an integral part of the text. On the other hand, the text also provides verbal instructions for constructions that are to be carried out by the reader's own hand in the form of crude drawings.

43 See: Hintikka J., *Logic, Language-Games and Information* (London: 1973).

44 Harper W., "Kant on Incongruent Counterparts" 278.

45 Catton P. – Montelle, C., "To Diagram, to Demonstrate, to Do, to See, and to Judge in Greek Geometry", *Philosophia Mathematica* 20, 1 (2012) 25–57; here: 43.

While the diagrams accompanying the text visualise the relations in question in a 'timeless' way, the constructions performed independently by the reader are thoroughly temporal as they only lead to an insight through the succession of prescribed steps. For readers, the sudden manifestation of knowledge or 'flash of understanding' only emerges from the interaction between *both* forms of diagrams. Catton and Montelle describe this as the 'epiphany' of a newly obtained truth.<sup>46</sup> And they explicitly position Kant as the successor of the Euclidean conception of geometry, which is based on the absolute necessity of diagrammatic operations as a source of synthetic knowledge. Working with geometric diagrams thus evokes information and insight that is not already present *in* the text.

Jan Wöpping's 2012 dissertation, *Space and Cognition: Elements of a Theory of the Epistemic Use of Diagrams*, demonstrates that with epistemically productive use of diagrams in general, as with Euclid's diagrams in particular,<sup>47</sup> the contemplation of a diagram generates knowledge that is *not* part of the construction of the diagram.<sup>48</sup> In the context of the explicit rules of diagram construction and the implicit conditions of historically situated use, diagrams are 'autonomous participants' and epistemic 'quasi-actors' in the cognitive process.<sup>49</sup> For Wöpping, this irreducibility of the use of diagrams is where Euclid and Kant meet: the construction of a figure conveys more qualities than its concept provides.<sup>50</sup>

The first proof in Euclid's first book immediately clarifies what this means. It shows that an equilateral triangle can be constructed on any line segment. In the corresponding drawing it is visually significant that, in a kind of 'geometric aspect seeing', the radius of a circle can be viewed *at the same time* as the side of an equilateral triangle.<sup>51</sup>

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46 See: Ibid. 50.

47 See: Wöpping J., *Raum und Wissen. Elemente einer Theorie epistemischen Diagrammgebrauches* (Berlin, New York: 2016) 89–121.

48 See: Netz R., "Greek Mathematical Diagrams: Their Use and Their Meaning", *For the Learning of Mathematics* 18, 3 (1998) 33–39. as well as: Netz R., *The Shaping of Deduction in Greek Mathematics* (Cambridge: 1999).

49 See: Wöpping, *Raum und Wissen* 51.

50 See: Ibid. 52.

51 Ibid. 110.

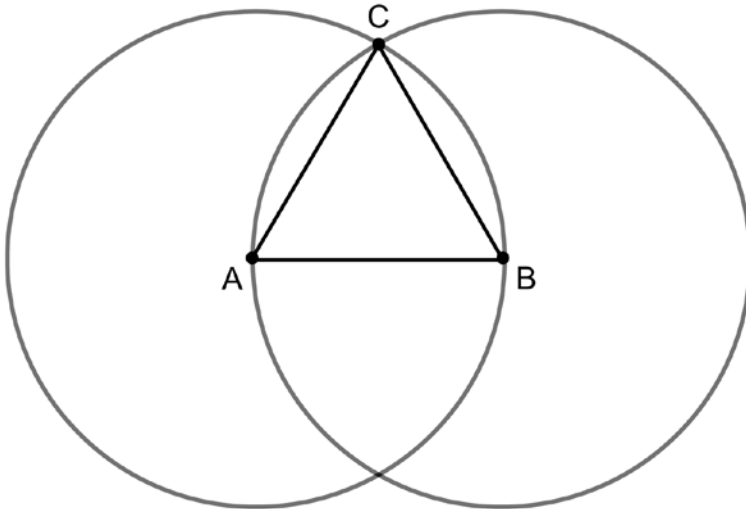


FIGURE 11.6 *Euclid I, 1, from Wöpping, Raum und Wissen 98.*

This change of aspect does not involve a reversible figure in the sense of Ludwig Wittgenstein's duck-rabbit, which involves a form that can be seen as another form. Rather, the same line can appear holistically in two different geometric figures and functions: as a *radius* it is a structural element of the circle, and as a *side* it is part of the equilateral triangle.<sup>52</sup> The essential use of the Euclidean proof depends on the potential for interference resulting from this double function or geometric change of aspect.

<sup>52</sup> Danielle Macbeth also points to this change of aspect as an epistemic resource. For Macbeth this change of aspect is an exclusively perceptive phenomenon, while for Wöpping it is not only visual but also pragmatically active: the various functional values of the geometric line reveal various possibilities for action, which are associated with the figure, see: Ariew R. – Macbeth D., "Diagrammatic Reasoning in Euclid's Elements", in Van Kerkhove B. – de Vuys J. – Van Bendegem J.P. (eds.), *Philosophical Perspectives on Mathematical Practice*, Texts in Philosophy 12 (London: 2010) 235–267. here: 377. as well as Macbeth D., "Seeing How It Goes: Paper-and-Pencil Reasoning in Mathematical Practice", in *Philosophia Mathematica* 3, 20 (2012) 58–85.



### Summary: Kant's Grounding of Mathematics in Intuition

- (1) Geometric concepts do not describe but, rather, prescribe actions that allow perceptible objects to be produced graphically. This requires tools (compasses and rulers) that are indeed idealized in Euclid as well as in Kant: the ruler has no metric scale, the compass can be opened as wide as one likes. In this way, geometric operations are concerned with *morphology* rather than measurement. Spatial relations are generated from the relative positions of points and lines on a plane.
- (2) Two basic operations are fundamental to Kant, as he emphasizes in a handwritten text: 'Drawing a straight line and rotating such a line around a fixed point'.<sup>53</sup> All geometric constructions can be reduced to the operations of drawing and rotating a line. The iterability of every act of construction is also essential.<sup>54</sup>
- (3) Geometric drawings also 'construct concepts', as they obey rules that determine what is mathematically relevant and irrelevant in the visible figures. This is precisely what schematisation means: in the act of drawing, 'many determinations, e.g., the magnitude of the sides and the angles, are entirely indifferent'.<sup>55</sup>
- (4) What is not irrelevant but rather vital to the schema is specific spatial direction. For example, the angles in a triangle must be interrelated in a particular way, such as ' $\Delta$ ' rather than '>>>'. Schematisation thus produces a directional configuration, which makes the corporeal orientation of epistemic subjects fundamental to the production and reception of intuitive configurations.
- (5) These subjects are sensibly affected by working with drawings due to the 'image mode' of schematisation, which allows something general to be seen in the individual. This mediation between the particular and the general, which schematisation performs, is associated with the imagination. The imagination is an imaging process. It transforms a drawing into a conceptually regulated mathematical object, and it thus converts the seeing of an empirical drawing into the intuition of a mathematical object.

53 Kant, *Gesammelte Schriften* xx, 411.

54 For more on iterability, see Friedman M., *Kant and the Exact Sciences* (London: 1994). and also Friedman M., "Kant on Geometry and Spatial Intuition", *Synthese* 186, 1 (2012). 231–255. URL = <<http://link.springer.com/article/10.1007%2F978-94-007-0066-2>>.

55 Kant, *Critique of Pure Reason* 630.

- (6) The 'object' that is generated by schematisation and perceived through intuition is not a 'thing' but rather a form that can be incorporated or instantiated in an unlimited number of drawn objects. This potential to record a general form is only realized in the iterability of the act of construction. According to Kant, therefore, spatiality should be considered an act of spatialisation.
- (7) Following Euclid, geometry became a (non-empirical) science that involved rules for the *graphic embodiment* of forms with the help of points, lines, and planes, which is precisely how geometry was understood and conceptualised by Kant. Intuition and imagination are necessary, as they make it possible to produce as well as to perceive the essential form in the drawn figure by disregarding its contingent attributes.
- (8) Kant always maintained that mathematics is not a glass bead game, but rather contributes to the knowledge of real objects. From this real-life epistemic perspective, it is possible to say that geometry is the science of the diagrammatic generation of forms and their correlations, which are necessary for real graphic projections of concrete and abstract objects.

Translated by Anthony Enns

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